Marine Engineering
And Shipping Age

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H. H. BROWN, Managing Editor

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Order Your Copy of the Annual Index Now

IN accordance with the practice established last year, the annual index of MARINE ENGINEERING AND SHIPPING AGE, which formerly was published as a part of the December issue, will be published separately at the end of the year. As the annual index will be useful only to those subscribers who have kept a complete file of the magazine for the year only a sufficient number of copies will be printed to fill the orders received for it at this office on or before December 1. A copy of the index will be mailed without cost to each subscriber whose order is received on or before that date.

The Butler Bill

IF the Butler Bill, now pending in the House of Representatives, which, as fully described on page 803 of this issue, provides for an efficient auxiliary naval reserve of mutual benefit to both the navy and the merchane marine, is being kept on the "waiting list" for the purpose of ascertaining the results of the disarmament conference before action, this is indeed a short-sighted policy. Whatever may be the decision in regard to the construction of warships it is the declared purpose of the United States as expressed in the preamble of the Jones Act to do whatever may be necessary to develop a merchant marine adequate in size to carry our share of our commerce and to serve as a naval or military auxiliary in time of emergency.

In spite of this declared purpose it has been the policy of the Government to delay action of the constructive sort on any legislation, or, for that matter, to enforce the laws that would benefit our merchant marine. Instead of holding up the hearings on this bill it ought to be apparent to any one much less informed than the Naval Committee of the House of Representatives that if it is decided to weaken our regular Navy it is even more important to provide for an efficient naval reserve.

Other countries have long ago recognized the necessity of having their merchant ships manned by a majority of their own nationals who are fully trained to serve their country in time of war. There is no better way than that which the Butler Bill provides to secure all-American crews for our ships and at the same time equalize the disparity existing between the wages of foreign and American seamen. The merit of this bill is recognized by both naval and shipping authorities, but of what value will it be if its passage is delayed until our vessels are tied up? We need action on this bill, and quickly, too, for the cheaper cost of operation of foreign ships is driving our vessels off the seas.

The Scythia

BECAUSE there is a surplus of cargo ships for the present condition of world trade, causing the tying up of a large number of this class of vessels, the United States is losing sight of the fact that there is a world shortage of 2,000,000 tons of passenger ships. This figure was given in a paper read last winter before one of England's leading technical marine societies and also at the launching of the *Empress of Canada*. The demand that exists for the remaining combination passenger and cargo vessels building for the Shipping Board also corroborates this statement and the fact that the Board continues to certify to the Interstate Commerce Commission that there are not sufficient American vessels to warrant the enforcement of the preferential rail rates proves that our surplus of tonnage does not include passenger ships. If America displayed half the broad foresight in dealing with its merchant marine that it does with its other industries it would not only expedite the reconditioning of the *Leviathan* and the other ex-German passenger vessels, but it would also have well under construction new liners of the most up-to-date type, which are needed to balance our merchant marine.

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This is exactly what England is doing, as many of her large shipping companies are proceeding with an active building program of liner construction. The *Scythia*, fully described on page 819 of this issue, represents the Cunard Line's latest type of post-war construction. Although not as large as the *Aquitania* and *Mauretania* she has the advantage of combining large cargo carrying capacity with luxurious passenger accommodations.

Whether or not the Cunard Line has taken the wisest policy in adopting the intermediate size of passenger ship exclusively in her present building program of a dozen vessels the fact remains that it will have a large fleet of new boats before we have even reconditioned our own. Is it not about time to help the unemployment situation and, incidentally, benefit the country by getting our most useful type of boats into commission? The repair yards are ready; the ex-German liners are not getting any younger and the time is not so far distant when it will be too late to renew them into the type of first-class vessels that they were intended to be. Even if we have lost our nerve entirely and have no stomach for entering into competition with foreign shipping companies in the passenger business, why not put these ships into shape and sell them to whatever country wants them rather than allow them to rot at their piers as they are now doing?

Discrimination

ALTHOUGH it is clearly recognized by both the shipping and shipbuilding interests that if the United States is to have an adequate merchant marine some form of Government assistance must be obtained, there is an honest difference of opinion as to whether this aid should be in the form of discriminatory duties or a direct subsidy. Either one of these methods would promote the construction of ships in American shipyards and also the sale of Shipping Board vessels to private owners. The principal objections to the direct subsidy are the difficulty of getting Congress to award such aid from the public treasury and the uncertainty from year to year of renewal. On the other hand the indirect subsidy or discriminatory duties, tonnage dues and preferential rail rates are certain to cause more or less friction for the steamship lines in transacting their business in foreign countries and, furthermore, their enforcement will necessitate the modification of existing treaties.

Although the President is directed by the Merchant Marine Act of 1920 to serve notice on such foreign governments as have treaties with us guaranteeing their ships the same or equal privileges to those that we grant our own, that such portions of these treaties as restrict the power of the United States to levy discriminatory duties and tonnage dues shall terminate at the expiration of the notice required in the respective treaties, President Wilson refused to obey this mandate of Congress and President Harding up to the present time has also evaded it.

No doubt the failure of our executives to follow the directions so plainly stated by Congress is largely due to the seriousness of disturbing existing treaties. But in neglecting this duty—for as we see it the President is bound to obey the law just the same as anyone else—both ex-President Wilson and President Harding have allowed the impression to grow in foreign countries that we are afraid to enforce these features of the Jones Act and, consequently, that they are free to inaugurate such discriminatory practices against our shipping as are not specifically prohibited by their treaties.

We are informed that the British Board of Trade has issued an order giving preferential treatment to British and Canadian vessels at the port of Jamaica. As the treaty of 1815 specifically excludes the West Indies from reciprocal privileges they have the legal right to do this but, in doing so, they have shown that they do not consider that the principle of preferential treatment is wrong.

For the benefit of those of our readers who did not closely follow the arguments presented during the passage of the Jones Act, it may be interesting to know that the powers of discrimination specified in that Act were supported by a number of Congressmen quite as much for the purpose of having a means of retaliation against the unfair shipping practices of foreign nations as for a method of equalizing the cost of operation of foreign and American shipping. Now that we have the examples of the Egyptian cotton contracts going to British ships in spite of our lower bids, the lower insurance rates on British vessels and the Jamaica order, there does not seem to be any legitimate objections why we should not enforce the Jones Act unless it be that we are losing our nerve and that we had rather "turn the other cheek" even if by so doing we have to tie up our entire fleet and acknowledge that the nation that once carried 90 percent of its commerce in its own ships must depend on foreign ocean delivery wagons to ship its products.

Foreign Trade and Shipping

CHAIRMAN LASKER of the Shipping Board in a recent speech before the Associated Advertising Clubs of the World laid down a great truth when he said that "the farmer in Kansas, the miner in Arizona and the industrial worker in Indiana" are just as much dependent upon the American merchant marine as "the dock worker in Baltimore or San Francisco for the regularity and volume of their daily wage." So long as we had a great empire to explore and develop there was not the need that now exists for foreign trade and we could live unto ourselves as a practically self-sustaining nation.

But now that surplusages have accumulated, unemployment has increased and prices of raw products have been demoralized. Until this excess has been consumed either at home or abroad, unemployment will continue and our surplus wealth, if not disposed of, will do us more actual harm than if we gave it away to the countries which need it so badly.

The whole world is looking to us for aid in this terrible time of industrial chaos for we have established a reputation for fair dealing and our duty as a civilized nation demands that we exert every influence to help stabilize the conditions in those countries where the political and financial situations are such that they are a menace to the welfare of the rest of the world. But insofar as we export our surplus products to the countries that need them we are also exporting the labor of the farmer in Kansas, the miner in Arizona and

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the industrial worker in Indiana and in so doing we are preventing a costly reduction in our production output and the consequent lowering of the American standard of living. But, as Chairman Lasker stated, only a national realization of the fact that whatever our business may be our continuous employment and prosperity depend on foreign trade and our merchant marine will assure for our ships the financial and legislative aid that they are entitled to receive.

The Panama Canal Tolls

THE action of the Senate, which is unquestionably the more conservative of the two branches of our national legislature, in passing the Borah Bill by a vote of 47 to 37 which restores free tolls to American vessels engaged in the coastwise trade, is not only significant as a pointer on the probable action on this bill in the House of Representatives but also as an indication of the honest opinion of our most able statesmen that we have the right to allow at least some of our vessels the privilege of passing through our own canal free of charge.

At the time the Borah Bill was introduced there were other bills before the Senate which exempted all American vessels from the payment of Panama Canal tolls. The supporters of these bills, however, felt that the Borah Bill had the greatest chance of success and agreed to give it their support and the right of way. It was and is still the opinion of many in shipping circles that the passage of the Borah Bill is more a test of legislative and public opinion on the Panama Canal toll question as applied to all American ships than of especial value to either our merchant marine or the country as a whole. In support of this statement are the facts that American ships have a monopoly of the coastwise trade guaranteed to them by law, that the amount involved in the exemption of these tolls amounts to only about $2,000,000 annually and that this law except in certain cases, one of which we will comment on later, simply favors coastwise shipping at the expense of the railroads which are taxed along with other industries for the payments of money spent in the construction of the canal.

One of the exceptions referred to above may be illustrated by the case of two shipments to the port of New York, one coming from Vancouver, B. C., and the other from Seattle. It is evident from the proximity of Seattle and Vancouver that this comparison is all the more applicable because these cargoes may be identical in nature and therefore that a decided advantage in the carriage of the same products is given to the American vessels. Other cases may be cited but this is sufficient to show that, if it is right to give the trade from Seattle in American vessels an advantage over the trade from Vancouver in foreign vessels, it is also just as proper to give the same advantage to all American ships going through the Panama Canal from or to any port in any country.

Unfortunately there is difference of opinion on this question in this country among our most prominent men whose integrity, ability and patriotism cannot be questioned. As stated by Mr. Marvin on page 800 of this issue, it does not appear that where such able men disagree on the interpretation of the Hay-Pauncefote treaty it would serve any useful purpose for us to argue the technical points involved. But if our able statesmen disagree on the favors that we are privileged under the above-mentioned treaty to give to American vessels passing through an American Canal, they are at least in accord with the principle that we *should have the right* to exempt American vessels from the payment of these tolls, if we so desire.

The status of this question at the present time, as indicated by the recent vote in the Senate, is that the majority of our statesmen believe that we have the right to exempt our vessels from the payment of tolls and that the minority believe that we have lost this right through the superior diplomacy of British statesmen. A treaty is a solemn agreement between two or more nations and its supreme purpose is to make it possible for the countries involved to live in peace with each other. Often privileges are granted to other countries for reciprocal benefits.

But our English contemporaries do not point out why the rights *that they claim* we signed away were surrendered. We should like to know what the United States got in return, if it gave up these rights, for it is not conceivable that we would construct and maintain a canal on our own soil for the benefit of foreign merchant marines.

The I. M. M. Hearing

ALTHOUGH many statements and inferences have been made to the effect that the International Mercantile Marine Company is dominated by British interests, the public hearing given to that organization by the Shipping Board on October 5 disclosed no evidence of any attempt by the British Government or steamship interests to interfere in any way with the management of the American company. On the contrary, it was found that the agreements entered into between the British Board of Trade and the International Mercantile Marine Company were in every instance secured through the solicitation of the American company for the purpose of obtaining the same privileges for their ships, which are under the British registry, that are accorded to English owned vessels.

Chairman Lasker, the full Shipping Board and the Board's chief councillor, Mr. Schlesinger, conducted the examination which lasted from ten o'clock in the morning with the exception of an hour's recess until six o'clock in the evening. After a short explanation of the nature of the meeting by Chairman Lasker, the entire time was taken up in listening to an exhaustive explanation of the history, management and ownership of the International Mercantile Marine Company by its president, Mr. P. A. S. Franklin, and in questioning him on every relevant and sometimes irrelevant point that the entire Board or its Council could conceive.

While the investigation was carried on in a friendly spirit and, as explained by Chairman Lasker, with the principal purpose of determining the potentiality of the power of the International Mercantile Marine Company to adversely influence American shipping, nevertheless it must have been a trying ordeal to Mr. Franklin and it is greatly to his credit that he answered every question frankly and directly without any apparent attempt at evasion.

As to the ownership of the International Mercantile Ma-

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rine Corporation, it was stated that the stock books as of August 1, 1921, show that 93½ percent of its stock is owned by American citizens, 5½ percent by Dutch, ½ of 1 percent by English and ½ of 1 percent by Canadians. Not only was a table of the number of preferred and common shares held in the different countries furnished but the Board was invited to appoint a committee of its members to examine the books and make any notes that it wished as to the individual holdings of any of the stockholders. All that was asked was that this information should be kept confidential by the Shipping Board.

Having established the ownership of the American company, it was declared that when the International Mercantile Marine Company took over the White Star Line, the International Navigation Company, Limited, the Red Star Line, the Leyland Line and the Atlantic Transport Line, the English owners sold their holdings outright and that the American company holds all of the stock in the important subsidiary companies. In addition to this, the American company holds 68.5 percent of the stock in the Aberdeen Line, 22.2 percent in Shaw, Savill and Albion Company, Limited, 10.4 percent in the Holland America Line and 16.5 percent in the New York Shipbuilding Corporation.

Referring to the management it was stated that the company had its own offices in charge of its own salaried employees in the principal seaports of the United States and Canada with a large number of sub-agents reporting to these offices from all sections of the country. It was also declared that the company had offices in all the important capitals and business centers of Great Britain and Europe.

It was brought out that the several agreements between the British Government and the American company had been given publicity both at the time of their consummation and since and that they had been filed with the Shipping Board in March, 1917; in January, 1919; in November, 1919, and still further referred to in correspondence. The 1903 agreement was made because the British Government had entered into negotiations with the Cunard company to loan that line sufficient funds to construct the two gigantic express liners *Mauretania* and *Lusitania* and had granted them a subsidy of sufficient size to pay the interest on the money and amortize the loan. This agreement secured the same assistance and mail contracts for the ships owned by the American company that were granted to British-owned ships and while it provided that the ships flying the British flag could not be transferred to the American registry without the consent of the British Government our own laws at that time would not permit of such a transfer. Another clause, forbidding the adoption of an operating policy for these American-owned vessels, which would be detrimental to British shipping, has never been evoked and was never considered to apply to ships flying the American flag.

However, at the request of the Shipping Board, the ships under the American registry were specifically exempted from the provisions of the previous contracts by the agreement of 1921, which is couched in practically the same language as the resolutions adopted by the Board. Although, according to Mr. Franklin, who by the way made his entire testimony under oath, the British Government never interfered in any way with the management of the American company, this exemption was highly desirable to set at rest any doubts that might arise on the subject.

In view of the fact that the International Mercantile Marine Company has been criticized for a lack of interest in the American merchant marine in spite of the fact that it built, owned and operated practically the only American passenger vessels that were in the transatlantic trade prior to the war, it is only just to state what this company has done to build up American shipping. It constructed at the Cramp shipyards in 1902 the *Kroonland* and *Finland* which it added to the fleet of four American ships that it then owned, namely the *New York, Philadelphia, St. Paul* and *St. Louis,* which composed the entire American flag passenger ships in the North Atlantic trade at that time. In 1915 it purchased the American steamers *Mongolia* and *Manchuria* and in 1917 the *Minnesota.* At the same time orders were placed with the New York Shipbuilding Company for the construction of two 12,000-ton freighters and one 6,000-ton freighter. In 1920 it transferred from the British flag to the American registry the *Minnekahda* of 17,200 gross tons and reconditioned her as a passenger steamer at a cost of $600,000.

Of still further interest is the fact that in 1918 it tried to dispose of its British ships to an English syndicate with the intention of reinvesting its money in American vessels but was prevented from doing this by the opposition of the American Government. Not discouraged at this, it has repeatedly endeavored to purchase the ex-German passenger ships, offering bids for the whole and various combinations of these vessels. One bid for thirty of these ships, including reconditioning, amounted to the sum of $78,500,000. Another bid, involving the *Leviathan* and *Mt. Vernon,* was particularly significant for it indicated a high class express passenger service for these ships on the New York-Southampton route.

This hearing was particularly valuable from several angles. It brought out the statement from Chairman Lasker that the Shipping Board was not in doubt as to the honesty and patriotism of Mr. Franklin and his company, but that they were concerned with the possibilities that a future management of the company might have the power through its English affiliations to injure American shipping. One of Chairman Lasker's questions was, would it be advisable to take into the Board's conferences with American companies owning American ships only a company like the International Mercantile Marine Company owning a large fleet of British ships? However, Chairman Lasker stated that it would be unfair to keep Mr. Franklin in doubt and that the Board would give its decision promptly.

Although it is most important to establish the status of the International Mercantile Marine Company in the minds of the American people, and we feel that the facts presented at this hearing ought to do it, the most important matter brought out, in our estimation, was a statement by Mr. Franklin which MARINE ENGINEERING AND SHIPPING AGE has repeatedly published and that is, that the world is not normally over tonnaged and that the useful tonnage of the world is not what it would have been if the war had not interfered with its natural growth.

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Operating Economy and The Merchant Marine

By R. H. M. Robinson*

The problem of economical operation is one of supreme importance to American shipping. It is one which American shipowners must keep especially in mind during the next five years, for these years will surely see either the making or the unmaking of our merchant marine.

AMERICAN participation in overseas' shipping is virtually a development of the last half-decade. American overseas' operators have acquired their experience, therefore, during a period of abnormally high freight rates, when large profits tended to lessen the incentive for economy and to foster extravagant habits. To a certain extent these habits have undergone correction during the past twelve months of depression, but any one who has studied the situation carefully knows that there is yet much to be done in this connection before American ships are able to engage in keen and sustained competition with foreign ships.

A great deal is being said these days about the need of Government assistance for the merchant marine. That such assistance is necessary, for a period at least, is generally admitted. The disadvantages peculiar to American registry —high wages accentuated by abnormal exchanges, the high initial cost of ships, strict navigation laws, etc.—are so great that until time and public opinion have had a chance to alter conditions, even the strictest economy on the part of the shipowners will not enable them to meet foreign competition. The Government must come forward with measures of direct or indirect assistance to help the shipowners surmount these difficulties, but the shipowners have the reciprocal duty of operating as economically as possible, so as to reduce the margin of disadvantage which the Government must offset.

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R. H. M. Robinson

Government Assistance Not a Gratuity

Whatever aid the Government may give to the merchant marine during its formative period should not be regarded as a gratuity but as a very worth-while national investment. Again, such aid should not be administered so as to encourage extravagance, but in such a way as to show clearly that it is a recognition of the faithful endeavor of the American shipowner, handicapped as he is, to establish a useful national institution.

The practice of economy in operating starts before the operations themselves are begun—it starts with the choice of the right ship for the trade. This involves a multitude of considerations, ranging from the more general questions of size, speed and fuel to the more technical ones of hull and machinery designs. To the layman a ship is a ship but the experienced mariner knows that out of a hundred different ships there is one better suited to the trade in question than all others. Americans, particularly, need to study this problem, because of their relative newness to many routes and because a large proportion of the present American fleet is of standard type ships, built to serve generally in an emergency rather than for a particular trade.

The economical advantages of the motorship, as compared with the steamship, are now established by experience in almost every trade. During the recent shipping depression, when hundreds of coal and oil burning steamers have been laid up, relatively little motor tonnage has been forced into idleness. The European countries are building motorships in large numbers. In the United States much less progress has been made in this direction and unless the situation is corrected we shall soon find that the nations which have low wages, low building costs, etc., are also operating large numbers of economical motorships, while we, with high building costs and high wages, are trying to compete with less economical steamships.

Assuming that the right ship is placed in a particular trade, there is yet great possibility of exercising economy in the matter of fuel. This item constitutes a very large percentage of the total operating expense, and carelessness with respect to purchase price or consumption may easily make the difference between a fair profit and a profitless voyage. Hearty cooperation from the ships' engineers is essential to this particular economy. Good results have been accomplished, notably by foreign companies, through holding out to the men the promise of a share in the savings effected through keeping the fuel consumption below a specified amount for a specified performance.

The engineers can also do much toward reducing expenses for machinery repairs; first, by taking good care of the machinery so as to obviate unnecessary damage; second, by making minor repairs which fall within their competence, rather than calling for outside assistance; third, by insisting on fair prices when repairs must be performed by local firms. Profiteering on repair work, especially in the less familiar

*Chairman of executive committee and acting president of the United American Lines. This organization operates the largest fleet of privately-owned cargo and cargo-passenger steamers under the American flag.

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foreign ports, is notorious and American ships have become known as easy and sometimes not unwilling victims of this kind of robbery.

American marine wages are higher than those of other countries. Under such circumstances one would expect the size of American crews to be kept down to the minimum consistent with efficiency, but this has not been the case. Under pressure of the present stringency the number of men carried on certain ships has been cut by 12 percent without infringing the navigation laws or the inspection regulations or in any way crippling the ships, showing that the former manning scales, which were in accordance with general American practice, were excessive. The fact that under certain foreign flags larger crews are carried is no justification for excessive crews on our own ships. Fewer skilled men are generally used on these foreign ships. Furthermore, it is entirely proper that the American shipowners should expect and receive, within reasonable limits, greater service from men who receive so much greater pay and have so much better living and working conditions on shipboard.

It is not the purpose of this brief article to discuss in detail the many economies in ship operation, which can and should be effected. The ones touched upon serve merely to illustrate the general statement that the American shipowner must adhere to the practice of economy in all its phases, if he is to become a permanent factor in world trade. And not only must the shipowner look to economy but he must have the consistent cooperation of the men on shipboard and at the terminals. Such cooperation is essential to successful operation in any industry, and especially in shipping.

The Senate Vote for Panama Canal Toll Exemption

Republican National Platform Upheld By Senate in Passing Borah Bill—Exemption of Coastwise Shipping Approved by Decisive Vote

By Winthrop L. Marvin*

MUCH oratorical thunder and lightning accompanied the passage through the Senate, October 10, of the Borah bill exempting American coastwise ships from the payment of tolls in the Panama Canal. President Harding in his pre-election speeches had stoutly advocated this policy. The Republican National platform on which he won his victory had declared for it. It is assumed that, when the President gives the word that the course is clear, the measure will be approved by the House of Representatives. Meanwhile, throughout the country there will be sharp discussion pro and con—for famous names are marshalled on both sides. For example, exemption has been supported by Olney, Roosevelt, Knox and Taft and opposed by Root, Choate and Wilson. On the whole the people of the nation, or a majority of them, appear to agree with the former view, as the decisive vote in the Senate has just demonstrated.

As Senator Ransdell of Louisiana told the Senate in the course of the debate, a canvass of certain representative elements of the country on this Panama Canal issue was undertaken a few weeks ago on behalf of the National Rivers and Harbors Congress. This association in a questionnaire appealed not only to its own officers and members living in the East, the South and the Middle West, but also to governors of States, mayors of cities, chambers of commerce and boards of trade, public libraries and the editors of daily and weekly newspapers. On the question presented in the Borah bill, of exemption from tolls of American ships engaged in coastwise trade, the voice of this highly intelligent constituency was 520 in favor and 158 against—or an affirmative of more than three to one. There is, therefore, reason to believe that an even more decisive majority than the Senate gave will be recorded when the Borah bill comes up in the House of Representatives.

Senate Debate Deliberate and Comprehensive

It is to the credit of the Senate that its discussion of the tolls exemption question was deliberate and comprehensive. A chief argument of the opposition was that the bill affronted Great Britain on the eve of the opening of the world disarmament conference. How far this plea may have counted as a factor in the final vote must be a matter of conjecture. But it is noteworthy that toward the end of the discussion Senator Lodge, the Republican leader in the Senate, put himself on record as believing that we had the legal right to pass American vessels through the Canal toll free, if we so determined, subject to arbitration which could be invoked under our general treaties with Great Britain.

But he announced that he would oppose exemption of coastwise ships exactly as he had done in 1912 and 1914, on the ground that the interest of foreign nations was unitedly against us on the issue, while public opinion was divided in the United States. And he pointed to the differing views of ex-President Roosevelt and ex-President Taft on the one hand and of ex-Secretary Root and ex-Ambassador Choate on the other. Senator McCormick of Illinois as a spokesman for the Middle West declared that he held that the United States had the right to do what the bill proposed, but held also that it was "unwise to do it on the eve of the conference on the limitation of armaments."

Coastwise Vessels Pay $1,500,000 Tolls Annually

Tolls are paid in the Panama Canal "at $1.20 per net vessel ton—each one hundred cubic feet of actual earning capacity." The tonnage in this case is determined by Panama Canal rules and not by the United States National rules of measurement. American coastwise vessels eastward bound and westward bound are now paying tolls at a rate of about $1,500,000 a year. Their tonnage and payments of late have been steadily increasing. Exemption of coastwise ships was warmly attacked in the Senate debate as a "subsidy to a monopoly."

It is true that American ships have a monopoly of coastwise traffic through the Panama Canal, as they do on the Great Lakes and in the trade from New York to Galveston and from Puget Sound to San Francisco. If this is a monopoly, it is a beneficent one. No political party or faction has the hardihood to attack it, for it was this coastwise law that gave the United States the technical skill and experience in shipbuilding and operation that made possible the creation of the immense war-built fleet in the world war emergency. It is the coastwise law that was responsible, in 1914, for the existence of seven-eighths of the American merchant marine.

Is Toll Exemption a Subsidy?

But is exemption a subsidy to these coastwise ships? The late George S. Dearborn, founder and president of the American-Hawaiian Steamship Company and a pioneer in

*Vice-president and general manager, American Steamship Owners' Association.

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steam navigation from coast to coast, did not so regard it. In a letter addressed to Senator O'Gorman, then chairman of the Committee on Interoceanic Canals, Mr. Dearborn in April, 1914, said:

"The American-Hawaiian Steamship Company has never contributed to a toll exemption propaganda nor made any effort to influence opinion upon the subject. A toll would be an operating expense, added to other expenses such as fuel, victualing, manning and upkeep, and, to its extent, would increase the cost of transporting a ton of freight, and this increase would necessarily be reflected in the rate of freight. The implication that the cost of fuel, crews, insurance and upkeep affects the rate of freight and that the addition of a toll does not is too fallacious to require answer."

Mr. Dearborn, out of his practical experience, manifestly believed that the enforcement of or exemption from tolls would directly affect the freight rates through the Canal, and that in the long run it was the shippers of merchandise who would pay the tolls or would enjoy the direct benefit of no tolls. This opinion is also the opinion of chambers of commerce and boards of trade of the Atlantic and Pacific seaboards, for, as Mr. Dearborn pointed out, they had been earnestly demanding the free toll privilege for coastwise shipping.

How much and how far exemption will affect freight rates must be left for the future to determine. When doctors of international law disagree, as did Root and Taft and Knox and Choate, it is not for laymen to pass on technical points of interpretation of the Hay-Pauncefote treaty. But Senator Ransdell cast a vivid side-light on the point at issue when he cited to the Senate the fact that distinguished senator after senator who considered and voted on the ratification of the Hay-Pauncefote treaty had announced at that time or afterward that they all voted for it in the conviction that the treaty in no way deprived the United States of the right to favor its coastwise shipping. Many senators declared of their action at that time that, if the contrary opinion had prevailed, the treaty would most certainly have been defeated.

UNITED STATES NOT DEPRIVED OF RIGHT TO FAVOR ITS COASTWISE SHIPPING

As a matter of fact, Senator Bard of California offered an amendment to the effect that "The United States reserves the right in the regulation and management of the Canal to discriminate in respect of the charges of traffic in favor of vessels of its own citizens engaged in the coastwise trade." This amendment was defeated—but, as the senators who then sat in the chamber uniformly testified, defeat was due to the general belief that such an amendment was superfluous—that the treaty did not limit in any way the power of the United States to deal as it might see fit with its coastwise ships and its domestic carrying. This is by all means the most significant development of the Senatorial debate.

It used to be a political custom to denounce protective tariffs as unconstitutional. But the ready answer always was that the Federal constitution was written by the very public men who in 1789 enacted the first protective tariff law "for the encouragement and protection of manufactures." To the thoughtful American people this statement of fact always seemed to be a sufficient answer—and the old Bourbon claim that protective tariffs are unconstitutional long since succumbed to the flight of time.

If the public men who analyzed and ratified the Hay-Pauncefote treaty did not know what that treaty actually meant then no men can know. As Senator Lodge said of the Bard amendment: "I voted against it in the belief that it was unnecessary; that the right to fix tolls, if we built the Canal or it was built under our auspices, was undoubted."

AMERICAN SHIPOWNERS UNANIMOUSLY ENDORSE THE BORAH BILL

As for the shipping men of the United States, they have generally hoped and believed that exemption of American coastwise shipping would prevail. The Borah bill was unanimously endorsed on July 11, 1921, by the Executive Committee of the American Steamship Owners' Association. If there is doubt about the interpretation of the treaty, a majority of the Senate has shown itself ready to resolve that doubt on the American side. An even larger majority of the Senate could undoubtedly be found to be prepared for the support of any aggressive policy for the upbuilding of American shipping.

A great hue and cry was raised before and after action of the Senate on the Borah bill, that it involved "a repudiation of a solemn treaty" and constituted "a course of National dishonor." Epithets always come more easily to some minds than arguments. They do not require so much study and reflection, and there are always with us those superheated partisans to whom their political opponents are always liars and scoundrels anyway.

Would Theodore Roosevelt invite his countrymen to ignore or violate their international obligations? Would Chief Justice Taft deliberately advocate a step which meant everlasting dishonor for America? To ask such questions is to answer them.

INTERPRETATION OF HAY-PAUNCEFOTE TREATY

The truth is that the language of the Hay-Pauncefote convention unfortunately admits of two contrary interpretations, one of which will be accepted in entire good faith by one group of men, while one will be convincing to the other. There have been divergent views in Great Britain as well as in the United States over the point at issue. The British Foreign Office was undoubtedly sincere when it declared at one time that the British government would have no basis for objection, if exemption from tolls at Panama were confined to bona fide coastwise carriers. It is the purpose of the Senate, as it will be of the House, to grant exemption only to ships with domestic cargoes passing from and to our own Atlantic and Pacific ports, under the terms of the Borah legislation.

It is no difficult matter to determine whether any given ship at Panama is actually engaged in coastwise traffic, even if she is sailing not under enrollment but under registry. The source, destination and character of the merchandise which the ship is carrying are conclusive. Repeated judicial decisions have affirmed that coastwise trade between New York and Galveston is no more a distinctively coastwise trade than trade conducted in American ships between New York and San Francisco. The nature of the traffic is in no way changed by the fact that in order to complete a coastwise voyage a ship has to pass by the ports of other lands and other governments.

The contest in the Senate over the Borah free tolls bill was, broadly speaking, a trial of strength between those public men there who would support vigorous measures for the strengthening of the American merchant marine and those who would oppose them. I would like to emphasize the words "broadly speaking"—for there were men like Senator Lodge of Massachusetts who, though intensely devoted to the cause of the merchant marine in general, were nevertheless constrained by technical considerations to vote against the toll exemption. When on June 15, 1914, the original no toll provision of the Panama Canal Act of August 24, 1912, was repealed under pressure from President Wilson, the result was immediate discouragement of the maritime aspirations of the American people. Shipowners, builders and merchants in this country instantly assumed that a majority of the American Congress was against them, and there was pronounced depression among all American shipping interests proportioned to the frank exultation abroad.

DECISIVE VOTE ON BORAH BILL ENCOURAGES SHIPPING INTERESTS

Now the situation is entirely reversed. The decisive vote upon the Borah bill powerfully encourages an expectation

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that other and more positive and valuable measures for the upbuilding of the merchant marine can count upon the prompt and loyal support of Congress. In this aspect the declaration for toll exemption for coastwise craft at Panama assumes a significance far beyond its actual intrinsic value to the ocean-going ships of the United States.

Defeat of the free tolls bill in the Senate would have been hailed in this country and abroad as indicating that the temper of the "upper house" of Congress was hostile to additional shipping legislation at this time, or even to the enforcement of laws already on the statute books. Any casual reader of European maritime or commercial newspapers can recall confident predictions that the free tolls bill would be defeated and that the Jones law, including even its uncontested features, would no more be enforced by the Harding than it was by the Wilson Administration. Undoubtedly these foreign newspapers have been so informed by their "listening stations" in America. Whatever the other results of the recent vote on free tolls may be, it will undoubtedly create a certain impression abroad that on this question of American ships the American people and their lawmakers are, after all, in earnest.

Hoover Proposes Use of Idle Ships in Coal Trade

THE Shipping Board has announced the receipt of a proposal made by Secretary Hoover of the Department of Commerce that idle ships be leased at $1 a month for the purpose of exporting coal to Europe in routes where America is losing business to foreigners, thereby protecting these foreign routes and giving work to unemployed miners. Mr. Hoover's thought was inspired by the fact that the Shipping Board had hundreds of idle ships and that if use could be made of the ships in the manner indicated a valuable export trade would be provided at a critical time. By this arrangement employment would be secured for miners who otherwise would be subjected to the hardship of unemployment.

The Shipping Board expressed itself as most sympathetic with Secretary Hoover's suggestion and expressed to him its entire willingness to concur and co-operate, providing Secretary Hoover could gain the assurance from private shipowners that they appreciated this move as creating tonnage that otherwise would not exist and therefore did not interfere with private shipowners' business, but rather, as a means of keeping alive a trade that would be lost to private shipowners, if left alone, and, if lost to the hands of Americans, would be lost to us permanently.

The Isherwood Banquet

IN view of the editorial expression in one of Great Britian's leading shipping magazines shortly after the testimonial dinner given to Charles M. Schwab of England's appreciation of what that gentleman had done for the allied cause when he was responsible for the construction of the ships that made Germany's hope of a successful submarine campaign impossible, MARINE ENGINEERING AND SHIPPING AGE is particularly pleased to have been represented at a banquet recently given to Sir Joseph Isherwood in acknowledgment of that gentleman's great constructive contributions to the shipping industry.

The fact that the longitudinal system of ship construction invented by Sir Joseph has been incorporated in the construction of about 1,400 vessels aggregating 12,000,000 deadweight tons carrying capacity shows that he deserves the honors recently given him by the British government, and the fact that the Isherwood system has been used in the construction of a large number of American as well as English vessels also shows what this banquet was intended to convey —the high respect and esteem that we hold for Sir Joseph in this country.

Motorships

IF a private corporation had a three-billion-dollar investment which it was unable successfully to develop, it would without doubt seek the advice of known experts in the industry in which its money was at stake and endeavor by all possible means to try out all reasonable policies so recommended. What, then, can be the excuse of the Shipping Board for neglecting to heed the counsel of Frank C. Munson, president of the Munson Steamship Line, who has demonstrated his ability to operate American steamships successfully and who is one of the few men heading long-established shipping companies in this country?

In brief, Mr. Munson states that the Shipping Board could dispose of at least 500 vessels, if it would convert them into motorships. He declared that, even if it cost from $150,000 to $250,000 to re-engine these ships, they could be readily sold at prices ranging from $350,000 to $500,000. This statement is substantiated by the fact that in the present shipping depression it is the steamship and not the motorship which has to be tied up. The motorship with its Diesel or semi-Diesel engine which requires only from one-third to one-half the fuel to operate that a steam installation of the same power uses and whose auxiliaries are driven by electric motors, the current for which is obtained from oil engine driven generating sets, needs no boilers, condensers, feed pumps or feed water. With the increased revenue earning cargo space thus obtained is it any wonder that 183 motorships of 502,944 gross tons are now building in various countries? The total tonnage of shipping under construction in America, according to the latest returns from Lloyd's Register of Shipping, shows that less than 8 percent—434,000 gross tons—of the tonnage building in the shipyards of the world is being constructed in the United States and of this program only three are motorships.

The duty of the Shipping Board, according to the Jones Act, is to determine what are the best types of ships and what are the most efficient, most modern and most economical types of propelling machinery. The Shipping Board has very properly re-engined several freighters with the turbo-electric drive, giving that type of marine propulsion an opportunity to demonstrate its efficiency. Why not try out a few motorships? Mr. Munson states that the 500 steel cargo ships ranging from 3,000 to 7,000 tons that are now tied up should be equipped with Diesel engines and that with these vessels so converted we could laugh at foreign steamship competition. Our higher wage scale, he declared, would be more than offset by the economies of operation, quick turn around and the driving force of American organization.

Of what use will it be to develop a shipping policy that will equalize the difference in cost of operation between American and foreign steamships if by the time we get the policy working we find that the foreign countries have with their motorships created another differential in their favor, which is equal or greater than that which now exists? Surely the Shipping Board cannot permit this to occur by keeping 500 vessels tied up that can be profitably converted into motorships.

With motorships aggregating over half a million gross tons under construction abroad our competitors in overseas shipping are not only adding several hundred highly efficient vessels to their existing merchant fleets but they are at the same time gaining valuable experience in the development of Diesel engines which our engine builders lack. Without such experience our ship and engine builders are seriously handicapped in providing our shipowners with the most efficient and economical types of vessels.

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Wage Subsidy Proposed for the Merchant Marine

By Waldon Fawcett

Added to the obvious point of contact, there are many inducements to interest American shipping interests in the outcome of the international disarmament conference at Washington. With the governmental polices of many nations with respect to the merchant marine governed by the exigencies of their naval establishments and with many of the world's shipyards and ship repair plants sustained in great part by naval patronage, it cannot be otherwise than that any radical change in naval programs and ideals would have a reaction upon the merchant marine.

OF close interest to shipowners and ship operators is the effect of the movement for the limitation of armaments upon nations which have been wont to contribute to the upbuilding and maintenance of their respective merchant fleets by means of subventions granted to vessels designed to permit of quick conversion from passenger or cargo craft to transports or supply ships. Certainly, there has been revealed a bond between the disarmament issue and the status of the personnel of the merchant marine. Particularly is this the case in the United States where an element of deepened significance is injected because of the disparity between the wages of foreign and American seamen.

Specifically, there hangs upon the result of the disarmament conference the fate of a bill recently introduced in the United States House of Representatives by Congressman Butler, the undeclared but manifest purpose of which is to aid the American merchant marine by a unique form of ship subsidy. The pending measure, which is designated H. R. 240 and which is now before the Committee on Naval Affairs of the lower house of Congress, is entitled "A bill authorizing the enrollment of officers and men of the merchant marine in the Naval Auxiliary Reserve." That caption gives such slight hint of the inner significance of this bill that it is perhaps not strange that shipping interests did not instinctively sense its importace. Gradually, however, its potentialities for the encouragement of the merchant marine have made appeal to the imagination of practical shipping men and the author of the bill has lately received most emphatic expressions of approval from leading executives in shipping circles.

Provisions of the Butler Bill

The Butler bill provides comprehensively that all officers and men who are employed in the seaman or engineering departments of seagoing vessels flying the United States ensign and who are citizens of the United States shall hereafter be eligible for membership in the Naval Auxiliary Reserve and shall be enrolled therein upon application and given a provisional rank or rating without examination of any kind and by so enrolling shall obligate themselves to serve in the Navy in time of war during the existence of a national emergency declared by the President. Enrollment, according to the stipulations of the bill, shall be for a period of four years or for a shorter period, corresponding with the time an applicant may be obligated to serve in the merchant marine but in no case for a period shorter than one year. It is required, furthermore that all members of this class, other than those of commissioned rank shall serve two months aboard a vessel of the United States Navy during each twelve-month period after enrollment.

Retainer Pay for Naval Reserve

Tangible encouragement for the American shipping interests, that have been handicapped in a competitive sense by high wage standards, is contained in Section 5 of the Butler Bill which provides for "retainer pay" for members of the proposed new class. For officers the pay would be, following confirmation, one month's base pay per annum of the corresponding rank in the Navy. For men there would be an allowance, before confirmation, at the rate of $120 per year and after confirmation at the rate of $180 per year.

That observance of the annual training period aboard naval vessels is to be taken seriously under the new project is attested by the provision in the pending bill that no retainer pay shall be paid to any member of the projected class who fails to perform his alloted duty with the regular Navy. Moreover there is to be no payment until the obligation for naval service has been discharged, when the retainer pay from the date of enrollment will be paid in one sum. In addition to the "retainer pay," above mentioned, there is to be paid to the reserves from the merchant marine, while serving in the regular Navy an amount equal to all pay and allowances which would have been due them from their regular employers during the time of their absence with the Navy plus the Navy pay and allowances of their provisional or confirmed rating.

Plainly the intent of the bill is to create a permanent, dependable reserve whose members look upon their incidental naval duties as a life work. To this end it is provided that if members of the auxiliary reserve class, who have been confirmed in an enlisted rating, sever their connections with the merchant marine, their retainer pay thereafter shall be two months' base pay of the corresponding Navy rating so long as they continue to perform active service with the Navy. Thus there is provided a means whereby the Government would keep a light hold upon men qualified for sea service and, incidentally, it is suspected that the prospect of an ever-waiting bonus might operate to draw back to the merchant marine capable seamen who might be tempted to abandon a seafaring life for some other form of employment, with which they would in time become dissatisfied.

Cash Gratuity for Twenty Years' Service

As further incentive to the same end it is authorized by the proposed law that enrolled members who have completed twenty years of service in the Naval Auxiliary Reserve and who have performed the amount of service required by the law during each term of enrollment shall, upon their own application, be retired with the rank and rating held by them at the time and shall receive in lieu of any pay a cash gratuity equal to the total amount of their retainer pay during the last term of enrollment. The requirements as to qualification for confirmation in rank and rating are, it may be explained, to be prescribed by the Secretary of the Navy, but under no circumstances can the holder of a provisional enlisted rating be confirmed who has not had at least two months' service in the regular Navy either prior or subsequent to enrollment.

Inasmuch as the benefits of the contemplated law would be available only to officers and men who are employed on "sea-going vessels" the definition of a sea-going vessel, within the meaning of the act, would upon occasion be likely to become a matter of importance. In order to provide for this contingency the Secretary of the Navy is empowered to determine whether or not a vessel is a sea-going vessel. In this same connection the Butler Bill also provides that hereafter all sea-going vessels flying the United States ensign shall be

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subject to such inspection as may be prescribed by the Secretary of the Navy.

ENCOURAGEMENT FOR ALL-AMERICAN PERSONNEL

The proposition to equalize the wages of foreign and American seamen by making up the excess received by our sailors through a naval retainer pay in return for which the Government would acquire an efficient Naval Reserve has been advocated for several years by such men as Admiral Bowles, Captain McAllister and others. Mr. Butler is a staunch friend of the movement for the upbuilding of the merchant marine, and his feeling is that a naval auxiliary reserve of at least 60,000 men enrolled from the personnel of the merchant marine would operate to strengthen the entire shipping industry and encourage an "all-American" personnel in the merchant service. While certain of its features have been embodied in previous legislative propositions, the Butler Bill in its entirety is accounted a unique, original suggestion. The General Staff is understood to favor the plan and, despite the fact that the bill is patently on the "waiting list," considerable sentiment in its favor has appeared spontaneously in Congress. The future of the Butler Bill depends upon the impress upon future U. S. naval policy made by the disarmament conference. If there is to be no check to the present trend of development, the Committee on Naval Affairs stands ready to inaugurate hearings on the Butler Bill with the idea of obtaining the views of practical men in naval and shipping circles and possibly making any changes in the wording of the bill that might seem desirable.

If the Butler Bill does not supply the sorely-needed panacea it is obvious that some other means must be sought, and speedily, too, to equalize or reconcile the disparity between the operating costs of foreign and American ships. This handicap upon the American merchant marine constitutes a problem that obtrudes, nowadays, upon almost every issue of public policy that involves transportation. It is an element that figures, for example, in the current drive to exempt vessels of American registry from the Panama Canal tolls. And the issue is intensified, by the by, in consequence of the continual agitation that American ships be manned exclusively by Americans.

"AMERICAN WAGES A HANDICAP," SAYS LASKER

In enumerating, in his address of October 5, the problems of the American merchant marine and the necessities to be met if private operation of the government fleet is to be profitable, Albert D. Lasker, chairman of the Shipping Board, placed first on his list the handicap of high wages, closely followed by the related obligations of expensive victualing and severe legislative requirements. He acknowledged that if American living standards are to be maintained on the seas as on land some means must be found to meet the difference between American and foreign wage standards, both in the shipyards and in the entire field of ship operation.

The disproportionate cost of operating American ships is a subject whose gravity and insistence was revealed during the Congressional hearings that preceded the passage of the Merchant Marine Act or the Jones Act, so-called, and that was emphasized during the Congressional investigation of the Shipping Board. For example, some months ago there was laid before a Congressional committee figures on the cost of wages and board per month on ships of different nations which showed that if the United States cost of operation be made the basis of computation as an allowance of 100 percent, the British cost is 54 percent, the Canadian cost 34 percent and the Japanese cost 17 percent. That the Canadian cost should be 66 percent less than the United States average has been accounted particularly significant.

Some members of Congress, who have, perhaps, looked into the matter only superficially, have been prone to reason that if the standards of the ports govern the wages of seamen there cannot be any excessive hardship for ship operators even though the American wage scale rules higher than that of any other country. Practical shipping men, as, for example, Mr. P. A. S. Franklin, have endeavored now and then to point out to misguided Congressmen that when an American ship enters a foreign port it is only a small percentage of the men who desert and are replaced by others at a lower wage. Similarly the foreign ship, setting forth with a low-pay crew, loses by desertion at her American port of call only a small proportion of her personnel who must be replaced at the higher scale. Under the Butler Bill, American seamen would have, to be sure, added incentive to cling to their places, but on the other hand the differential paid by the Government would go far to take care of the ship operator's extra burden.

SPECIFIC EXAMPLE OF WAGE DISPARITY

When the Commerce Committee of the United States Senate was drafting what was to become by enactment the Merchant Marine Act of 1920 it was supplied with figures that showed in detail the serious consequences of that wage disparity that the Butler Bill would go far to correct. For example, Frank C. Munson made his memorable comparison of the British steamer *Munarden* and the American steamer *Walter D. Munson,* the former a coal burner and the latter an oil burner, but chosen for comparison because each carries a crew of forty-two men. The pay roll of the British vessel was given as 733 pounds sterling as compared with a monthly pay roll of $4,262.50 on the American vessel. If six men were added to the crew of the *Walter D. Munson* to make her a coal burner, thereby affording an even basis for comparison, the disparity of the monthly pay roll would be increased by $540, in addition to the expense of victualing the six extra men.

The pay or wage disparity between American and foreign scales has always been sufficiently marked in the case of every class of ship personnel to constitute a balance of power in competition. During the past few years, however, it has been particularly marked in the case of officers. Thus, a difference of perhaps 25 percent (at post war rates of exchange) in the pay of British and American able seamen has been overshadowed by a gap between the compensation of officers of the two nationalities, indicated when the pay of the captain of the *Munarden,* 42 pounds sterling per month, is set over against the $343.75 allowed the captain of the *Walter D. Munson,* and when the average pay of the mates on the British vessel, 22 pounds sterling, is placed in deadly parallel with the stipend of $586.25 for three mates on the American ship. The chief engineer of the British steamer receiving 30 pounds sterling per month has responsibilities equivalent to the chief engineer of the American oil burner, who is paid $318.75 per month.

PROVIDES DECISIVE ADVANTAGE REGARDING OFFICERS

Experienced operators, such as Mr. Munson, have declared that British shipowners have operating costs that are on an average 40 percent lower than the American, principally because of the inequalities in pay. They have conceded the claim that with respect to the ordinary personnel of a ship —the seamen, firemen and coal passers—there may be something in the contention of the labor leaders that a foreign ship coming into United States ports regularly will be all but compelled to raise wages to an approximation of the American standard. But that is not true, it is insisted, in the case of the officers. The foreign officers stick by their ships, giving the foreign owner the benefit of an appreciable saving. That this is a decisive advantage in a competitive sense will be accepted when it is considered that on many a vessel the expense of operation is pretty evenly divided between payments to officers and payments to or on behalf of crew instead of the bulk of the outlay going to enlisted personnel other than officers.

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Developments In Marine Insurance

Concrete Ships—Lake Hulls—Motor Boats—Shipowner's Liability — Contributory Values — Unrepaired Damage

By "Bordereaux"

IN the judgment of the great majority of marine underwriters the concrete ship has not demonstrated her acceptableness as an insurable risk. They observe with open skepticism the efforts of exponents of this form of vessel construction in endeavoring to convince the shipping world of its superiority. It has recently been said that the only major defect so far developed in the concreter is her small resistance to local shock, as, for instance, when she bumps into a dock, and that this is negatived by the ease and inexpensiveness of repairs. They tell the underwriters that recently a concreter was repaired in four hours, and at a trifling cost; that her crushed stern was made whole again by the simple device of listing her, chipping out a space four feet by five, and pouring in the cement. It would have taken two weeks to effect the repair of such an injury to a steel vessel. But the underwriter shakes his head and replies that, aside from lasting qualities, the concrete hull will always weigh more than a steel one of equal displacement and that concrete ships can be successfully employed only on routes where space rather than tonnage cargoes predominate. This alone, they argue, would preclude the use of concrete vessels as tankers. In this connection it is interesting to remember that the American Bureau of Shipping gives the "experimental" classification to concrete vessels, as also does London Lloyds. Full classification, though denied at the present time, may come eventually, if warranted by experience.

As an ocean-going cargo carrier it is too soon to pass definitely upon the value of the concreter, though she has proved her usefulness as a harbor craft. Despite the improvements in concrete construction since California gave us the famous *Faith,* the material now employed being much lighter and stronger, the underwriter remains doubtful as to the effects of engine vibrations, endurance in casualties, etc. Insurance rates on the *Faith* were, in many particulars, much higher than those charged on steel vessels. When builders proposed to overcome the defect of weight by reducing the thickness of the hulls, the underwriters objected on the ground that a thinner hull, combined with the porosity of the cement, might allow the water to reach the steel reinforcement and seriously weaken it through rusting. They cannot forget how the concrete steamer *Cape Fear* crumbled to pieces and sank with the loss of seventeen of her crew when she collided with the steel steamer *City of Atlanta,* less than a year ago.

Lake Hull Insurance

LAKE hull insurance has shown, so far, a slightly better margin of profit than in recent years; but perhaps a less attractive account will have to be recorded before navigation closes and the fall storms have taken their customary toll of the underwriter. Hull valuations at $70 per gross registered ton do not tend to over-confidence. As usual, the Great Lakes Protective Association covers the first 25 percent of the lake fleet at 3¼ percent. Disbursements are covered in the general market, and particular average claims come under a 3 percent franchise. The experience of the Great Lakes Protective Association for several consecutive years has been an underwriting deficit of about $250,000. The insurance on the two thousand or more vessels in the Great Lakes fleet is placed by a comparatively small number of brokers and is, in the main, carried by the old line companies.

In view of the low valuations the warranty found in ocean hull policies, limiting the disbursements insurance to 15 percent of the hull value, is omitted from the form of the lake hull policy, leaving the owner at liberty to insure any amount he desires on this interest. "Detention earnings" is a form of insurance more commonly used by owners of lake vessels than by those of ocean-going steamers. This cover commits the underwriter to pay so much a day, according to the amount of the policy, for each day in excess of seven days and not exceeding twenty-six days, that the vessel is detained by casualty, other than total loss, from performing her service. The rate is 4¼ percent. The rate on steel vessels is always the same; that is, 3¾ percent, which is about 3⅜ percent net to the assured.

Under the regular form of lake policy the vessels insured are allowed to navigate the waters, bays, harbors, rivers, canals and other tributaries of the Great Lakes, not below Lake Erie. For an additional premium smaller vessels may have their navigation limits extended to include trips as far down as Montreal. Steel vessels are warranted to be laid up out of commission between November 30 and May 1, on account of the severe winters and the perils from ice. In consideration of an additional premium steel steamers may be permitted to navigate in the early part of April and as late as December 12. But ice claims are payable on damage sustained during these sailings only in excess of 3 percent on the entire valuation. Such early season losses sometimes reach the neighborhood of $200,000. An analysis of lake claims shows that most of them are occasioned by ice damage, with the striking of bridges, docks and similar obstacles running a close second.

Motor Boats Disliked

LAKE motor boats are not in good standing with underwriters. They have lost too much money on them. And the chief reason for this dislike lies in the inexperience of the men who run them—that is, their owners. It is quite a different thing to handle a motor boat engine and to run an automobile, but not every owner realizes this at first. Feed pipes clog very readily; and careless use of cigarettes in the area affected by the overflow results in instant and stubborn fires. Higher-priced boats, from $10,000 to $25,000, are readily insurable, for the reason that experienced engineers and competent crews are usually on them. Motor boats employed for commercial purposes are practically uninsurable; the moral hazard looms ominously in craft so exposed as these to loss of profit.

Shipowners' Liability

UNDERWRITERS regret the evident feeling of bitterness entertained toward them by certain steamship interests, due, for the most part, because of the activity displayed by the former in attempting to have the Harter Act so amended as to compel the carriers to live up to the obligation imposed by the relationship existing between carrier and shipper. It should always be remembered that the underwriters have nothing to lose as a result of the carriers evading their responsibilities; it merely means that if the underwriters

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are forced to assume the burdens which properly belong to the carriers the rates will have to be increased to a point where the premiums will offset the losses.

It is believed that the faults will be eliminated very quickly, if carriers are held to a strict accountability, but that otherwise we will have a repetition of the pilferage fiasco—an ever-increasing carelessness, with corresponding increases in losses. The economic waste thus entailed is never overcome by mere compensation for losses, many of which could be obviated by proper precautions. It is hoped by the underwriters that the carriers will come to see the situation in this reasonable light, as so much depends upon close cooperation between shipowners, shippers and underwriters in the upbuilding of our hoped-for foreign trade.

The "Shipped" Bill

IN the second interim report of the Chamber of Shipping and Pilferage, recently received from England, the phrase "received for shipment" is discussed in an important and direct manner. The recommendation of the Chamber's committee is as follows: "The custom of issuing bills of lading for goods 'received for shipment,' except where the circumstances make no other form appropriate, should be discouraged, as it gives scope for pilferage, and in no case should shipowners, under whatsoever pressure from merchants, issue a 'shipped' bill of lading until the goods are on board the steamer, as the difficulties of protecting the steamer against claims for pilferage which may have happened before shipment are thereby greatly increased."

Contributory Values

THERE appears to be considerable confusion in the mind of the layman as to the basis of contributory values in general average. The proper test to apply is, "What value did the party receive which he would not have received if vessel and cargo had perished?" Property contributes on the basis of net arrived values, thus cargo pays on its landed value less cost of landing, such as duty, destination, freight, cartage and expenses at port of refuge. Likewise the vessel pays on its damaged arrived value, less costs of temporary repairs which may have been made subsequent to the disaster. The value made good must itself contribute.

Identical Ownership

IDENTICAL ownership barred recovery in a recent interesting suit by a marine insurer against the United States Railroad Administration. It was the case of the Globe and Rutgers Fire Insurance Company vs. Hines, agent, 273 Federal Reporter 774, and both vessels in the collision were the property of the Railroad Administration. In giving judgment for the defendant the Court of Appeals made some interesting points. It was held that an underwriter of marine insurance who paid a loss resulting from a collision against an insured vessel and another is subrogated to the rights of the insured owner of the vessel against the other vessel in regard to the loss. The marine underwriter can only recover when the insured could have recovered. There can be no right of subrogation in favor of the marine underwriter for loss paid on a ship injured in the collision where the injured ship and the one which was responsible for the injury are owned by the same party.

Negligence and Liability

DOUBTLESS some of our readers have wondered at times just what liability rests with a marine underwriter in event of a vessel striking a reef and sinking when the day is clear and the sea calm and the disaster is unquestionably due to the negligence of the master. The answer is that the underwriter must pay. As a reef is one of the perils that lurks in the deep it comes under the definition of "perils of the sea." The fact that the day was clear and the sea calm and the master's negligence was responsible for striking the reef cannot relieve the underwriter from liability. He undertakes to cover loss or damage due to perils of the sea, and does not limit this undertaking to a certain state of weather or condition of the sea. Nor does the basic form of policy contain any clause whereby the underwriter would be excluded for an insured loss simply because it was occasioned by negligence.

The Hudson River Bridge

THE proposed pontoon bridge over the Hudson River is being contemplated with some misgivings by inland hull underwriters. They realize that the risk on the larger vessels operating on the Hudson may be materially increased by the construction of a bridge such as the one now under consideration. Says one underwriter, "The wooden ships were enough of a nightmare to insurers during their sailing days without having them arise from their graves to again haunt us."

Bill of Lading Notations

THE question is often asked whether a steamship bill of lading stamped "not liable for pilferage" relieves the ocean carrier from liability for loss through pilferage. The Harter Act prohibits the shipowner from making any notation on the bill of lading relieving the carrier from liability for loss or damage arising from negligence, fault or failure of proper loading, stowage, custody, care or proper delivery of cargo, and renders void any words or clauses in bills of lading or shipping receipts which tend to abrogate this liability.

Unrepaired Damage

UNREPAIRED damage often involves underwriting complications. An interesting light on the subject was cast, not long since, by so eminent an authority as Justice McAvoy of the New York Supreme Court. In the course of his opinion he observed: "The rule of maritime jurists as to liability of insurers is that the vessel's owners or the assured should receive the amount of estimated damage at the port of distress regardless of the fact that actual repairs might be made for a lesser amount at another port to which the vessel could be towed or proceed upon her own motivation (Pitman v. Universal Marine Insurance Company, 9 Queen's Bench Division, 192; Insurance Company v. Southgate, 5 Peters, 604). This rule, of course, may be averted by specific agreement of the assured and assurer to adopt another media of liquidating damage. The theory that an assured is limited to the actual amount paid for actual repairs would lead to the absurdity that if he made no repairs at all and used the vessel in her damaged condition he could recover nothing (The Keeler, 194 Federal, 342). The survey provided for in case of damage in such an instance would be useless; else why survey when actual cost of actual repairs is the sole criterion?"

Sweat Damage

SO much misunderstanding has arisen over the term "ship's sweat or steam of hold" that many underwriters are discontinuing the use of that phraseology and substituting "actual contact of cargo with sweat of vessel." There is a moisture in the hold of every vessel which does not amount to sweat and for which underwriters should not make themselves liable. This matter has been prominently before the underwriters in recent months in connection with shipments of rubber and other commodities, but they may still be reluctant to make the change in their policies which conservative underwriting demands.

RECONDITIONING THE LEVIATHAN.—Estimates for reconditioning the *Leviathan*, specifications for which were sent to shipbuilders on October 29, place the cost at over $8,000,000. The cost of converting the vessel from a coal to an oil burner will probably amount to $1,250,000.

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Are You a Shipping Man, á la Edison?

Questions That Thomas A. Edison Might Ask to Test the Qualificaitons of a General Shipping Man

By "Old Scotch"

SO many readers were interested in the 100 questions propounded in a recent issue to test the qualifications which Mr. Edison, were he a shipping man, might propound for prospective marine engineers to enter his employ, that I have been asked to prepare a similar set of questions applicable to the requirements for a general shipping man.

As stated in the prelude to the engineering questions, the standard set by Mr. Edison involves a fair understanding of historical facts, general information and technical lore connected with the profession. In this case they will, in general, be simple questions which should be answered offhand by one versed in the art: if they require you to hunt up references on the particular subject involved, that will help you to retain the information sought after. In any event, if you think that you are a fairly well informed ship man, just give yourself an examination in the following questions and do your own marking.

If you conscientiously can award yourself a mark of 70 percent, then we will recommend that you be put on the "waiting list," that is waiting until Mr. Edison gets out of the electrical business and goes into shipping. I don't know how long this will be and no one else does. Here they are:

1. What is meant by a bare-boat charter?
2. What is meant by a time charter?
3. What very important service did the *Great Eastern* perform before she was broken up?
4. Name three important steamship lines operating in the North Atlantic.
5. What duty does the United States Government alone perform yearly for all the leading maritime nations, as a direct result of the loss of the *Titanic?*
6. What is barratry?
7. Why are ships classified?
8. What is "particular average" in connection with marine insurance?
9. Where are the Grand Banks?
10. What precautions should be taken before a man is allowed to enter a tank which has contained fuel oil or cargo oil?
11. What is meant by a 3-inch line?
12. What articles should be kept at all times in a lifeboat on a sea-going vessel?
13. What relation does the scope of an anchor chain bear to the depth of water in which a vessel may be anchored?
14. Who invented the first deep sea sounding apparatus?
15. What are the advantages of stockless anchors over the ordinary type?
16. What is the best material for treenails in wooden ships?
17. What kind of wood is generally used for sheaves in blocks?
18. What is a snatch block?
19. Of what material is oakum made?
20. How many cubic feet in a so-called cargo ton?
21. How many cubic feet of living space must be provided for each seaman in American ships?
22. What transatlantic liner was first given the appellation of "greyhound?"
23. What is dunnage?
24. What was the name of the American naval officer who first laid out the so-called Atlantic lanes?
25. Which is further east, Valparaiso, Chile, or Valparaiso, Indiana?
26. Under what circumstances would a sea-anchor be used?
27. Wherein does the action of the gyroscopic compass differ from the ordinary magnetic compass?
28. What famous Englishman lost his life in searching for the Northwest passage?
29. What are the duties of the United States Commissioner of Navigation?
30. How much life boatage is required on an American sea-going freighter?
31. What is great circle sailing?
32. On what basis are pilotage fees usually charged?
33. What was the name of the only seven-masted schooner ever built in this country?
34. What is the meaning of C. I. F. in shipping circles?
35. What is a harness cask and why was it so named?
36. Name the most famous line of American transatlantic steamers, prior to 1860.
37. Why are the sails on many small vessels in European waters red instead of white?
38. Where is the cross-jack yard on a full-rigged ship?
39. Why were double top-sails adopted on square riggers?
40. Who wrote the first great American treatise on navigation?
41. Why were wooden vessels copper-sheathed below the waterline?
42. Who named the Gulf stream?
43. What is the youngest age at which a master or chief engineer can secure a license from the Steamboat Inspection Service?
44. What is the largest vessel in the world, now afloat?
45. Who is the present chairman of the United States shipping Board?
46. How many life-preservers must be carried on American vessels?
47. What is the smallest sized steam vessel required to carry a licensed master, under United States Laws?
48. How often must all steam vessels in the United States be inspected by the Government?
49. What is general average, pertaining to marine insurance?
50. What is a P. P. I. marine policy?
51. Why are bilge keels used?
52. What is an orlop deck?
53. What is a shelter deck?
54. What is a sheer strake?
55. Why is it made heavier than other strakes?
56. What is a bridge deck bunker?
57. What is a three-island ship?
58. If a merchant ship has been damaged, what certificate is necessary before she again proceeds to sea?
59. What is a block coefficient?
60. Give an average percentage of block coefficiency for a freighter.
61. When cargo is carried at "ship's option, weight or measurement," what is meant?
62. What is the ordinary capacity of a cargo winch in tons?

(*Concluded on page* 824)

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Officers and Committee Members of the Marine Equipment Association of America

(1) Col. E. A. Simmons, Simmons-Boardman Publishing Company, president; (2) K. L. Ames, Jr., American Steel Foundries, secretary; (3) Frank Hatch, Shephard Electric Crane and Hoist Company, chairman of entertainment committee; (4) J. C. McQuiston, Westinghouse Electric and Manufacturing Company, executive committee; (5) H. F. Alexander, Pacific Steamship Company, executive committee; (6) G. W. Selby, Marine Decking and Supply Company, executive committee; (7) J. D. Sarles, Pyle-National Company, executive committee; (8) Captain C. A. McAllister, American Bureau of Shipping, chairman of joint committee of the Society of Naval Architects and Marine Engineers and the Marine Equipment Association; (9) H. L. Hibbard, Cutler-Hammer Manufacturing Company, executive committee; (10) F. C. Bradbury, Crane Company, executive committee; (11) W. A. Cather, Worthington Pump and Machinery Corporation, chairman of publicity committee; (12) G. C. Fuller, The Superheater Company, joint committee of the Society of Naval Architects and Marine Engineers and the Marine Equipment Association.

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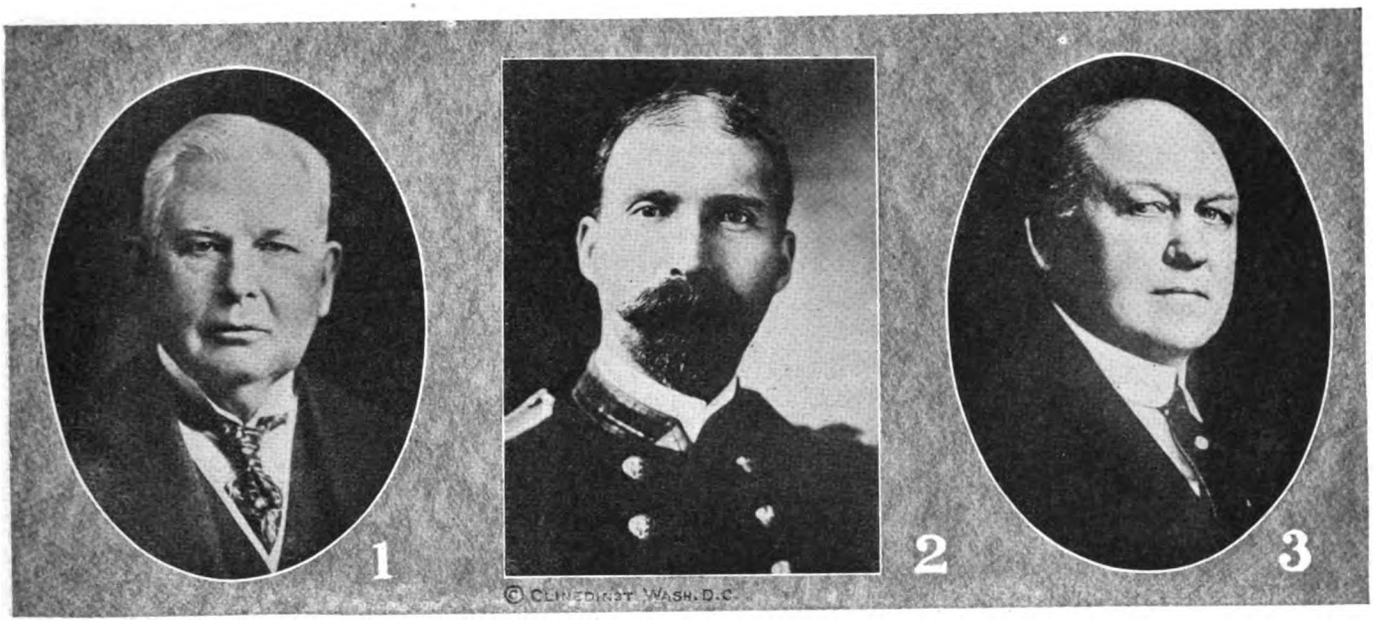

(1) Stevenson Taylor, President, American Bureau of Shipping. (2) Rear Admiral W. L. Capps, U. S. N., President, Society of Naval Architects and Marine Engineers. (3) H. H. Raymond, President, American Steamship Owners' Association.

A Successful "American Marine Week" Is Assured

Plans for First Cooperative Marine Exposition Ever Held in This Country Nearing Completion—Opens on November 14

Technical Committees to Inspect Exhibits — Marine Engineering and Shipping Age to Issue a Daily, Reporting Programs, Speeches and News

THE Marine Exposition, which is to be held at the Central Mercantile Building, Sixth avenue, between West 18th and West 19th streets, New York city, during the week of November 14, promises to be the greatest all-marine gathering ever held in this country. The determination of the shipbuilders, shipowners and ship operators to get together and present a united force for the preservation and development of our merchant marine is reflected in the decision of the American Steamship Owners' Association to have its technical committee represent that organization on Steamship Owners' Day at the exposition. The same spirit is also true of our own classification society, the American Bureau of Shipping, which has called a luncheon meeting of its technical committees at the Engineers' Club on Thursday, November 17, and of the Atlantic Coast Shipbuilders' Association, which has offered the facilities of its office for the distribution of tickets and literature to its members.

When one considers the support given to the coming exposition by the above-mentioned organizations in addition to the backing of the Society of Naval Architects and Marine Engineers which expects to have 1,000 of its 1,755 members in attendance at its annual convention November 17 and 18 and also the cooperation of the American Society of Marine Draftsmen, which has arranged to hold its annual convention on November 17, 18 and 19 in order to coincide with the week of the Marine Exposition, it is evident that the first concerted effort to make "American Marine Week" a time of combined gatherings of marine associations has met with unqualified success.

In recognition of the value of "American Marine Week" as a factor in creating a national realization of the relation of our merchant marine to our future prosperity, the Marine Equipment Association has spared neither time nor expense to perfect all business and social arrangements. Days and evenings will be given special names, such as Navy Night, Shipping Board Night, Shipowners' Day and Naval Architects' Day and on each occasion appropriate speeches will be made by prominent speakers. In order that the programs, speeches and news of this great event may be given the publicity it deserves, MARINE ENGINEERING AND SHIPPING AGE will issue a daily edition which it will distribute every morning at the exposition. While the *Railway Age* has issued daily editions at railroad conventions for many years, this is the first time that it has been attempted by any publication in the marine field.

Invitations to attend the exposition have been sent to the delegations attending the conference for the limitation of armaments, the foreign naval commissions and the naval attaches of the foreign embassies. As a large number of these distinguished people are interested in shipping and as the embassies courteously furnished their names with expressions of interest, there is no doubt of a large attendance of these gentlemen who will carry back to their respective countries the knowledge of what America can do in the construction of ships and their equipment.

SPECIAL EXHIBITS

In addition to this the exhibits of the United States Navy and the Shipping Board will be of particular interest to those attending the conference for the limitation of armaments, and to a great number of naval experts from all over the world

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who will be in New York at this time. The Navy Department will exhibit over 150 special items representing the Bureaus of Construction and Repair, Ordnance, Engineering, Navigation, Marine Corps and Aeronautics. The Shipping Board will show a 50-foot model of the latest type of 535-foot combination passenger and cargo steamer and a model of a standard stateroom.

The body of the exposition will contain much that is new and up-to-date in marine equipment, affording an opportunity for all shipping men to keep abreast of the developments in the marine field. The necessity for successful men to know all about the equipment used in their profession is obvious and attending an exposition of this sort is the best way to get this knowledge. Shipping and shipbuilding concerns will profit by requiring at least one of their staff to file a report of the important improvements and new devices exhibited.

American Steamship Owners' Association

The American Steamship Owners' Association will be officially represented at the Marine Exposition by their technical committee which will attend in a body on Wednesday afternoon, November 16, at 3 o'clock. Wednesday is Steamship Owners' Day and this committee is particularly fitted to represent that body of men because it is their duty to advise the steamship interests on all matters of a technical nature. While these men individually decide upon what type of equipment their respective companies will use in their ships, they also influence to a large extent the procedure that the American Steamship Owners' Association adopts for the good of our merchant marine. The technical committee studies such prospective legislation as the subdivision of ships by transverse bulkheads, the load line, the disposal of oily residue and the rules for the inspection of steamboats. As a result of these studies the Congressional committees are furnished with facts relating to the merchant marine that they may refer to in the formulation of rules and laws. The members of the technical committee are as follows: William F. Gibbs, chief of construction, International Mercantile Marine Company, chairman; John H. Telford, superintending engineer, Munson Steamship Line; A. S. Hebble, superintending engineer, Southern Pacific Company, Atlantic Steamship Lines; James Donald, president, States Marine and Commercial Company; Warren F. Barry, superintending marine constructor, Fall River Line; C. E. Ward, Jr., vice-president Merchant Shipbuilding Corporation, representing United American Lines; R. W. Morrell, marine superintendent, Tide Water Oil Company.

American Bureau of Shipping

The American Bureau of Shipping is strongly in favor of the growing tendency of marine organizations to get together. In recognition of the value of the united action displayed by the marine societies which are backing the Marine Exposition, the bureau has called a luncheon meeting of its technical committees at the Engineers' Club, New York City, at 1 o'clock Thursday, November 17; and all of them will naturally attend the exposition. As these committees are formed to give the technical staff of the American Bureau of Shipping the opportunity to obtain the opinions of the best naval architects and marine engineers in the country, the assurance of their attendance and cooperation during "American Marine Week" is highly significant.

The exposition will be formally opened at 2 o'clock Monday afternoon, November 14. On other days it will open at 10 a. m. and it will close every evening at 10 p. m. Between 10 a. m. and 7 p. m. it will be closed to the public so that those engaged in the shipping business may talk in comfort. After 7 p. m. it will be thrown open to the public and every effort made to convey to all industries the realization of the relation of our merchant marine to our future prosperity.

Badges having distinctive colors will be provided for the business, professional men and guests attending the exposition. Every one who registers will receive a badge having a separate number and complete lists will be published each day in both alphabetical and numerical order giving the names and numbers of the persons who have received badges. This will make identification easy and promote social and constructive acquaintances.

Program of Naval Architects' Meeting

THE twenty-ninth general meeting of the Society of Naval Architects and Marine Engineers will be held at the Engineering Societies Building, 29 West 39th Street, New York, Thursday and Friday, November 17 and 18, 1921. The business sessions will begin promptly at 10 o'clock each day.

This year the afternoon session on Thursday will be devoted to the reading of papers pertaining to electric ship propulsion and will be held jointly with the American Institute of Electrical Engineers. The papers arranged for presentation at the meeting are as follows:

Thursday Morning, November 17.

"The Tactical Relations Between Different Classes of Men-of-War and Their Embodiment in Design." By Rear Admiral W. L. Rodgers, U. S. N.

"Development of the Three Plane Navy, With or Without Battleships." By Mason S. Chace, naval architect.

"American Classification of American Vessels." By W. A. Dobson, naval architect, William Cramp & Sons Ship & Engine Building Company.

Thursday Afternoon, November 17

"Electric Propulsion of Ships." By W. E. Thau, general engineer, Westinghouse Electric & Manufacturing Company.

"Electric Auxiliaries on Merchant Ships." By E. D. Dickinson, mechanical engineer, marine department, General Electric Company.

Friday Morning, November 18

"How Can American Ships Compete Successfully with Foreign Ships?" By W. L. Marvin, vice-president and general manager, American Steamship Owners' Association.

"The Importance of Port Facilities in the Development of Merchant Marine and Commerce." By Rear Admiral H. H. Rousseau, U. S. N.

"American Apprenticeships, Schools and Scholarships." By C. F. Bailey, engineering director, Newport News Shipbuilding & Dry Dock Company.

"Cost Accounting and Estimating." By H. H. Schultze, superintendent estimating division, Bethlehem Shipbuilding Corporation.

Friday Afternoon, November 18

"Design and Construction of Passenger Steamers." By E. H. Rigg, naval architect, New York Shipbuilding Corporation.

"The Influence of Shape of Transverse Sections Upon Resistance." By Professor H. C. Sadler and Professor E. M. Bragg, both of University of Michigan.

"Calculation of the Transverse Strength of Submarines by Marbec's Method." By Professor Wm. Hovgaard, Massachusetts Institute of Technology.

"Power and Speed Trials, 10,000 D. W. Ton Tanker." By Professor H. A. Everett, naval architect, Union Shipbuilding Company.

The annual banquet will be held in the Grand Ball Room of the Waldorf-Astoria, 34th Street and Fifth Avenue, Friday evening, November 18, at 7:30.

As has previously been announced, the meeting of the Society is being held during the same week as the Marine Exposition. A committee, made up of Captain C. A. McAllister, chairman; J. Howland Gardner, W. H. Todd, H. H. Raymond and F. L. DuBosque, has been appointed to cooperate with a similar committee of the Marine Equipment Association of America to arrange a satisfactory program for the week of the exposition. In order to afford the members of the society an opportunity to visit the exposition during hours specially set apart for them a taxi-cab service will be operated by the Marine Equipment Association between the Engineering Societies Building, where the society will meet, and the Central Mercantile Building, where the show will

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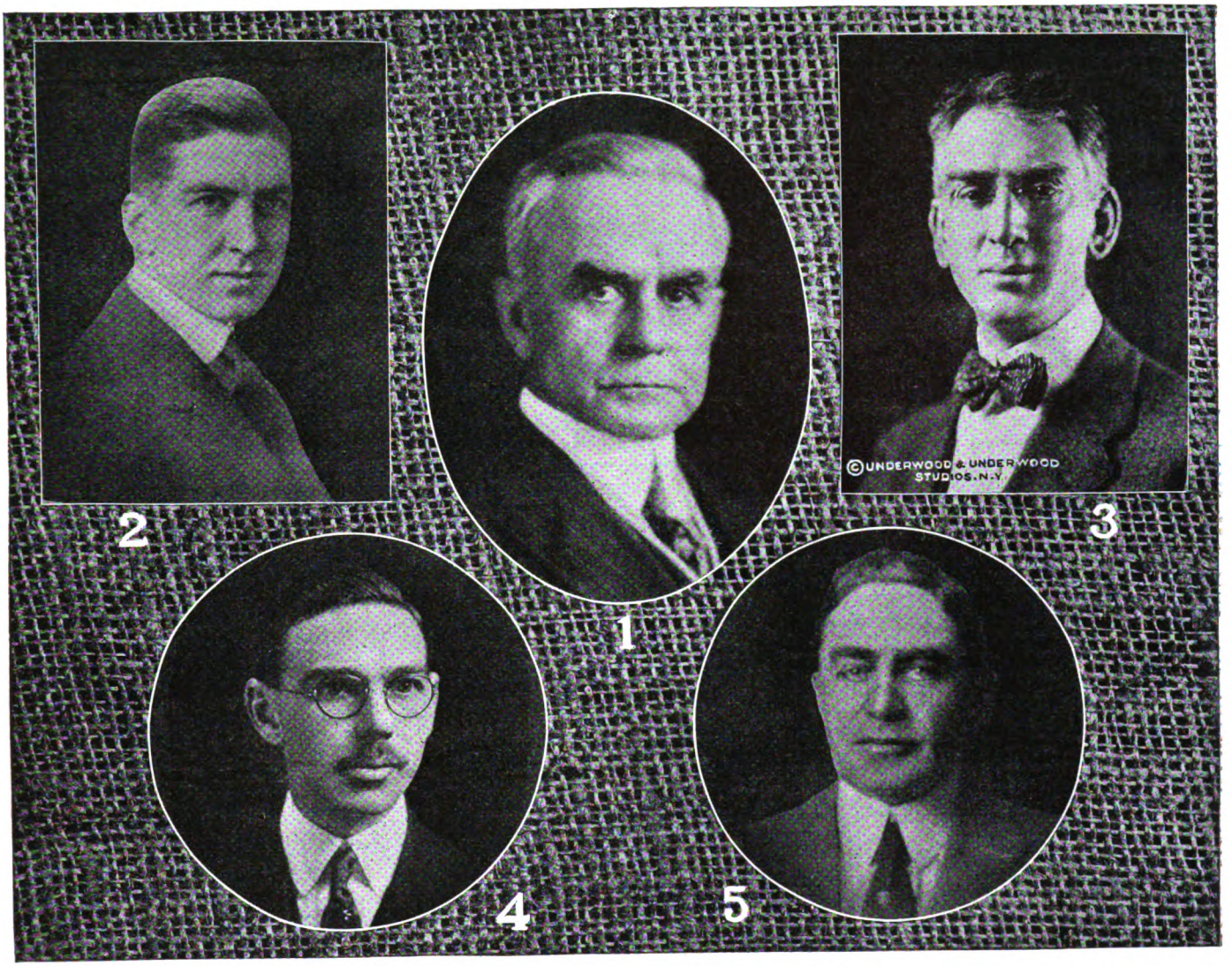

THE EXHIBIT COMMITTEE, MARINE EQUIPMENT ASSOCIATION

(1) W. M. Wampler, The Ellcon Company and Coen Company, Incorporated, Chairman. (2) Robert B. Lea, The Sperry Gyroscope Company. (3) William H. Easton, Westinghouse Electric and Manufacturing Company. (4) A. S. Hoffman, The Griscom-Russell Company. (5) Gardner Cornett, Pneumercator Company, Incorporated.

be held. The exposition will be open from 10 A. M. to 10 P. M., except on the first day, when it will open at 2 P. M. Thursday from 4 P. M. to 7 P. M. and Friday and Saturday from 10 A. M. to 7 P. M. will be known as "Naval Architects' Days."

Program of Marine Draftsmen's Convention

THE tenth annual convention of the American Society of Marine Draftsmen will be held in the Engineering Societies Building, 29 West 39th Street, New York city, November 17, 18 and 19, 1921. The regular business and professional sessions will begin at 10 a. m. each day.

The national executive committee of the society will meet at 10 a. m. Thursday, November 17, in the convention headquarters selected by the local committee at the Hotel Breslin, Broadway, at 29th street, New York, to examine the credentials of the representatives from the following branches: Delaware River, Boston, Quincy, Bridgeport, Hudson River, Connecticut, Bath, District of Columbia, Newport News, Bethlehem and New York.

The auditing committee, composed of members from the Bridgeport, Delaware and New York branches, will meet at the same time and place. In the evening the executive committee and visiting representatives in a body will attend the Marine Exposition, local branch No. 23 participating in the Exposition with a brilliant display of the draftsmen's work.

On Friday, November 18, the regular business session will be held for which the program is roll call, announcements, minutes of the 1920 convention held in Washington, D. C., proposals of amendments to the constitution and by-laws, report of the auditing committee, report of officers, executive, standing and special committees, also reports from the various branches. In the evening the local committee plans a regal reception to the executive committeemen, members and representatives by going in a body to "Get Together," now playing at the Hippodrome.

On Saturday, November 19, morning sessions will be taken up by unfinished business, general and new business, selection of the city for the 1922 convention, nomination and election of officers for 1921-1922. The afternoon sessions will be devoted to the reading and discussion of technical papers and lectures. On Saturday evening the annual banquet and reception will be held at the Hotel Breslin. The local committee, consisting of F. Adler, H. Dunham, R. Doerflinger, W. Robertson and C. Jacobson, promises to have on hand a good entertainment by professional talent and some very able speakers.

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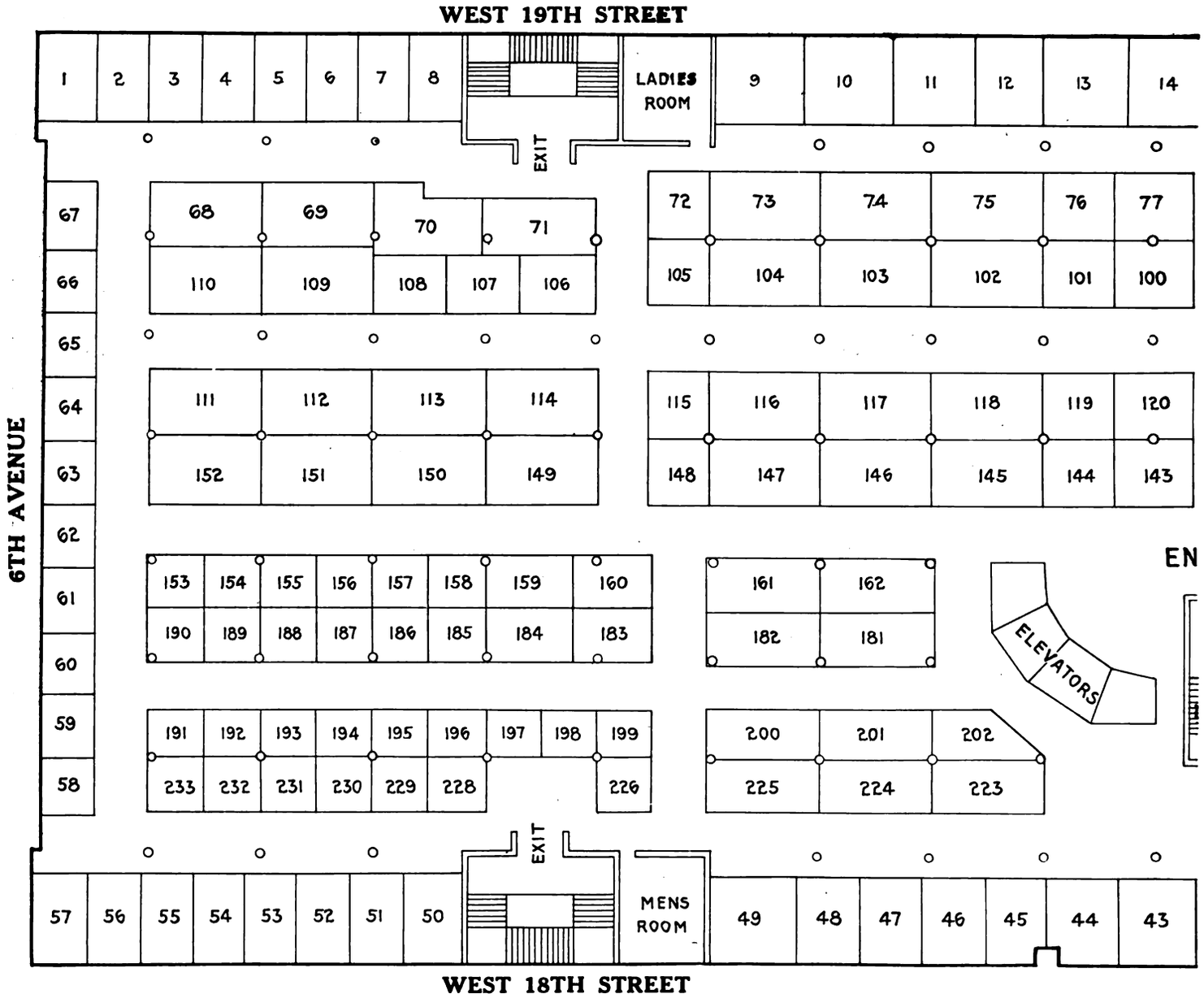

Floor Plan of Annual Marine Exposition to Be Held at the Centr New York City, Novem

Directory of Exhibits

The American Brass Company, Waterbury, Conn.—Brass, copper and bronze in sheets, plates, wire, rods, bars and tubes; tobin bronze rods and shafting; turbine blading, brass, nickel and bronze, Cupro nickel and monel metal; condenser tubes, Admiralty and Muntz metal; condenser head plates. Booth 75.

American Car & Foundry Company, 165 Broadway, New York.—Berwick electric rivet heater; Berwick electric scarfing heater; Berwick electric rod heater. Representatives: F. C. Cheston, D. B. Wallace, W. M. Earl. Booth 150.

American Engineering Company, Philadelphia, Pa.—35 horsepower electric winch; electro-hydraulic steerer driven by Hele-Shaw pump and controlled by A-E-Co. hydraulic telemotor; Hele-Shaw electro-hydraulic winch; small electric windlass; steering wheels and stockless anchors. Representatives: P. E. Kriebel, D. C. Spencer, E. B. Bryant, C. V. Koons, F. W. Kay, R. C. Lamond and H. Buckholtz. Booths 81 and 96.

American Manganese Bronze Company, Holmesburg, Philadelphia, Pa.—HY-TEN-SL bronze propeller blade; manganese bronze propeller blade; charts of comparative tests on propeller metals; photographs of installations, etc. Representatives: C. R. Spare, T. H. Addie, D. V. Williamson. Booth 63.

American Steel Foundries, Chicago, Ill.—Dunn anchors. Representative: A. I. Jones. Booth 159.

Asbestolith Manufacturing Company, 1 Madison Avenue, New York.—Asbestolith sanitary fireproof flooring, wainscoting, stair covering, etc., and superior ship decking. Representative: R C. Burnside. Booth 206.

The Ashton Valve Company, 126 Liberty Street, New York. —Safety valves, relief valve, whistles, pressure and vacuum gages, gage and boiler testing outfits. Representative: Charles W. Buckelew. Booth 197.

The Babcock & Wilcox Company, 85 Liberty Street, New York.—Drawings of half actual size of various types of boilers; electric concentration indicator; models of oil burners, headers and all valves and fittings as installed on Babcock & Wilcox boilers. Representatives: J. Coleman, J. H. King, J. Graham, T. B. Stillman, E. A. Colson, C. W. Middleton. Booths 16, 17 and 18.

Bethlehem Shipbuilding Corporation, Ltd., Bethlehem, Pa. —The Bethlehem-Weir line of auxiliaries, which will include: 25-ton evaporator, 14-inch centrifugal pump direct connected to 9-inch by 8-inch vertical steam engine, 9½-inch by 7-inch by 15-inch dual air pump, 3½-inch by 2½-inch by 5-inch feed pump, 8½-inch by 6-inch by 18-inch feed pump, 7¼-inch by 5-inch by 10-inch horizontal fuel oil pump, 10½-inch by 8-inch by 22-inch pair of feed pumps and tank; pump body

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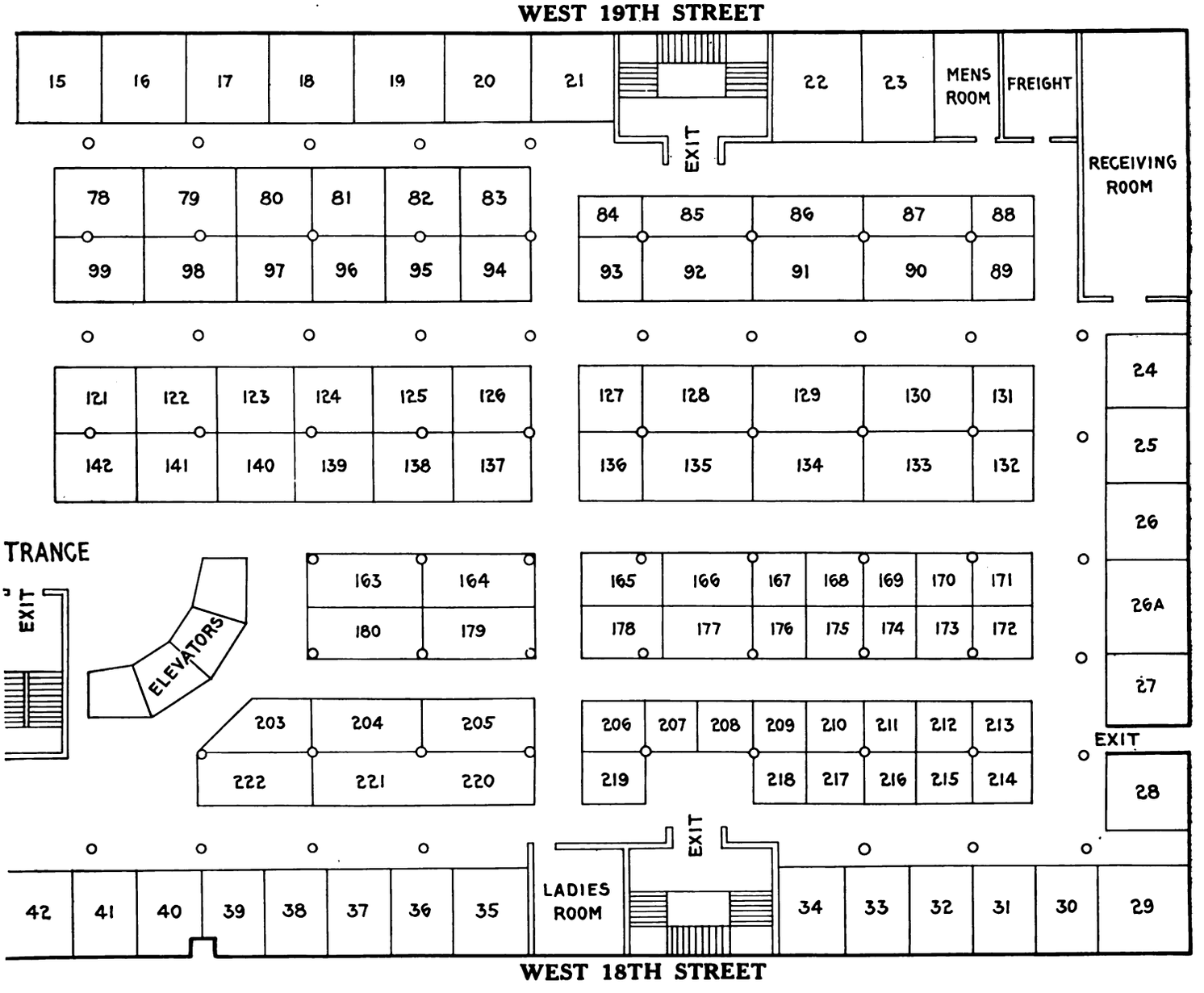

al Mercantile Building, 6th Avenue, Between 18th and 19th Streets, ber 14 to 19 Inclusive

and valve chest 21-inch by 14-inch by 27-inch feed pump; 7-inch by 8-inch by 18-inch general service pump; 4½-inch by 5-inch by 12-inch general service pump; Bethlehem duplex ram hydraulic telemotor with the transmitter and receiver connected; a complete Bethlehem (Dahl) mechanical oil burning system including pumps and a section of the furnace front; and a representative line of marine valves and fittings. Representatives: K. W. Heinrich and A. V. Reynolds. Booths 163, 164, 179 and 180.

The H. E. Boucher Mfg. Company, 150 Lafayette Street, New York.—Miniature marine reproductions; practical miniature power and sail boats; steam and electric machinery; high grade fittings for exhibition models. Representatives: H E. Boucher, Dwight S. Simpson, F. J. Harjes. Booths 84 and 93.

Brunswick Refrigerating Company, New Brunswick, N. J. —Refrigerating, ice making and water cooling apparatus. Representative: W. O. Whitney. Booth 103.

Chase Metal Works and Chase Rolling Mill Company, Waterbury, Conn.—A display of manufactured non-ferrous products such as brass, copper and bronze sheet, rod, wire and tubing. The exhibit comprises the following products: Brazed tubing, showing the original sheet, the forming process, welded seam and finished material; seamless tubing, showing the original billet or cast shell with intermediate sizes during the drawing operations; rods of various alloys, round, square, hexagon and many other shapes, both drawn and extruded; sheet brass, ordinary brass alloys, bronze and nickel silver; wire, coils of wire of various composition, including bronze and phosphor bronze wire; miscellaneous samples of finished products, bent into various forms to illustrate the strength and ductility of rods, wire and tubing; microphotographs showing the crystalline structure of the various alloys and samples of rod and tubing showing the flanging, flattening, expansion, crushing, twisting and other physical tests, for strength, ductility and hardness required by the United States Government and various consumers. Representatives: J. F. Giffin, R. G. Barton, H. B. Snyder, M. A. Joy, A. G. Craft. Booth 20.

James Clark, Jr., Electric Company, 154 Nassau Street, New York.—Electric grinders and electric drilling machines. Representatives: A. H. Briggs and W. M. Briggs. Booth 231.

Coen Company, Inc., 112 Market Street, San Francisco, Cal. —Mechanical oil burning equipment; cleanable oil heater; various size oil strainers; oil burners; furnace fronts. Representatives: Wm. M. Wampler, F. Hall, H. B. Chamberlain, F. S. Harper. Booth 136.

The Crandall Engineering Company, East Boston, Mass.— Photographs, etc., of dry dock installations. Representative: J. Stuart Crandall. Booth 58.

Crane Company, Chicago, Ill.—Complete line of valves and fittings for all types of ships. Representatives: F. C. Bradbury, J. F Duffy, E. Morgenthal and G. E. Barker. Booths 116 and 147.

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Crane Packing Company, 1913 Park Row Building, New York.—Full line of "JOHN CRANE" flexible metallic packings for general power plant use; "JOHN CRANE" process for packing surface condensers so arranged that actual demonstrations regarding the process can be made. Representatives: Julian N. Walton and A. W. Payne. Booth 232.

M. T. Davidson Company, 154 Nassau Street, New York.—"Davidson" vertical marine pumps; "Davidson" patent ash ejector. Representatives: John Lowe, William E. Brennan, William C. Newell, F. O. Kompass, Thos. J. Rogers. Booths 115 and 148.

Diamond Power Specialty Company, 90 West Street, New York.—New "Diamond" automatic rear end front operated soot blower for double and single ended Scotch marine boilers; improved "Diamond" rear end soot blower for single ended Scotch boilers; "Diamond" front end oscillating type soot blower for Scotch marine boilers; "Diamond" model "G" revolving soot blower for watertube boilers; "Diamond" model "E" soot blowing system for hollow staybolt horizontal baffled watertube boilers; new designs of blower heads and operating mechanisms for watertube boiler blowers; an exhibit of calorized metal specimens showing the effect of high temperatures upon iron and steel, and the heat-resisting qualities of soot blower elements made from calorized metal. Representatives: F. W. Leahy, M. Nicholls, F. W. Lambert, Robert June. Booth 158.

The Ellcon Company, 50 Church Street, New York.—White porcelain enameled pipe, anti-slip treads, engine room ladders. Representatives: G. H. Ord, C. A. Koenig. Booth 127.

Fairbanks, Morse & Company, Chicago, Ill.—Two hundred horsepower semi-Diesel direct reversible type C-O engine; 30 horsepower marine generating set. Representatives: D. G. Langlands, Messrs. Drennen, Slingman and Jernberg. Booths 121, 122, 141 and 142.

Foster Marine Boiler Corporation, 111 Broadway, New York.—Literature describing the Foster marine watertube boiler and features such as permanent steel baffles and a metallic cap for closing hand hole openings by a metal to metal joint. Key caps will be shown and a roller tool used in connection with these caps. Representatives: J. J. Nelis, J. C. McKenzie and F. Glander. Booth 190.

General Electric Company, Schenectady, N. Y.—Space used for reception purposes only. Rrepresentatives: S. V. Travis, J. Anderson, L. W. Shugg, H. W. Parsons, C. H. Giroux, A. Kennedy, Jr., W. J. Day. Booth 9.

Great Lakes, Hudson and Atlantic Waterways Association.—Representatives: Charles Ogden, J. P. Gleason, Dr. Henry Moskowitz, Samuel McAukin. Booths 47 and 49.

The Griscom-Russell Company, 90 West Street, New York.—Evaporators, distillers, feed water heaters, fuel oil heaters, oil coolers, grease extractors, strainers and steam separators. Representatives: Robert Colston and A. S. Hoffman. Booths 112 and 151.

Horne Manufacturing Company, Mercer and Colgate Streets, Jersey City, N. J.—Watertight electrical fixtures; circuit breakers; running light indicators; fire alarm thermostats; plugs and receptacles; cargo reflectors; mechanical ships' telegraphs; voice tube fittings. Representatives: L. W. Horne and A. E. Rackliffe. Booth 199.

H. J. Hush, 36 West 60th Street, New York.—Lighterage hoists, pumps, power propelling engines, emergency pumps, D. C. lighting sets. Representatives: J. S. McConville, J. Walsh, H. J. Hush. Booth 21.

International Compositions Company, Inc., 23 Park Place, New York.—Anti-corrosive and anti-fouling compositions and general marine utility paints. Representative: F. W. Petri. Booth 60.

International Mercantile Marine Company, 11 Broadway, New York.—Photographs of vessels of the American, White Star and Red Star Lines. Booths 194 and 195.

Johns-Manville, Inc., Madison Avenue and 41st Street, New York.—Complete line of asbestos products, including refrigerating machine packings, insulations and other power specialties, roofings and building materials. Representatives: H. H. Wesley, J. M. Berdan, B. C. McClure, R. F. Massa, G. K. Bradfield, C. J. Beckwith, F. J. Bryne, C. Rinehart, W. S. Lockwood. Booth 114.

Keasby & Mattison, 217 Broadway, New York.—Working model consisting of coils of piping with various forms of pipe covering; steam will be generated and passed through the model and thermometers and recording devices will indicate the percentage of heat units saved by the various forms of covering over the losses of bare pipe. Representatives: L. L. Barrett, B. U. Livingston, Jr., C. A. Alles and E. F. Kelly. Booth 19.

Kingsbury Machine Works, 4320 Tackawanna Street, Frankford, Philadelphia, Pa.—Kingsbury marine thrust bearings, adjustable and equalizing types; testing machine demonstrating operation; air-lubricated bearing showing complete separation of bearing faces. Representatives: Albert Kingsbury, Nelson Ogden, Paul F. Murphy, J. Frank Cox. Booths 165 and 178.

Lee and Simmons, Inc., 44 Whitehall Street, New York.—Models of covered barge, tugboat, steam lighter, steam hoisting lighter and lighter *Harding*, launched this year; photographs of the various types of vessels used in the lighterage business of the port of New York. Representatives: David T. Lamond, Chauncey Miller, Ryland Palmer, Ralph O. Wilson, Joseph P. Heuer. Booth 12.

The Lunkenheimer Company, Cincinnati, O.—Globe, gate, safety and check valves; oil cups; grease cups; lubricators; oiling devices; whistles, cocks; injectors and engineering appliances in general. Representatives: Walter A. Reynolds, James Cooper, Frank Hyatt, H. Burger, Philip Smith. Booth 149.

Magnesia Association of America, 721 Bulletin Building, Philadelphia, Pa.—85 percent Magnesia pipe and boiler covering; 85 percent Magnesia blocks and locomotive lagging; 85 percent Magnesia plastic, carbonate of Magnesia. Representatives: C. J. Stover and G. S. Stuart. Booth 152.

Marine Decking & Supply Company, Philadelphia, Pa.—Lit-O-Sil-O decking and flooring; Madesco tackle blocks, shackles and sheaves; Madesco paints and varnishes; Madesco "Quaker" cargo hoister. Representatives: W. L. Peebles and G. W. Selby. Booth 200.

Marine Engineering and Shipping Age, Woolworth Building, New York.—*Marine Engineering and Shipping Age, The Boiler Maker,* "Shipbuilding Cyclopedia," "Practical Marine Engineering," "Laying Out for Boiler Makers" and marine books. Representatives: Colonel E. A. Simmons, Henry Lee, C. R. Mills, R. V. Wright, George Slate, F. B. Webster, H. H. Brown, T. G. Newbery, S. M. Phillips, L. S. Blodgett, W. Z. Gardner, H. B. Bolander, H. L. Buhrrus, J. A. Miller, R. F. Duysters, N. C. B. Fowles, J. E. Anderson. Booths 80 and 97.

The Marine News, 26 Water Street, New York.—Files of *The Marine News* and lists of special services. Representatives: Harwood Palmer, H. J. Harding, George Weiss and A. H. Addoms. Booth 198.

The Marine Review, Cleveland, Ohio.—*The Marine Review.* Representatives: V. S. Iden and J. Fuller. Booth 160.

Mercantile Specialties Corporation, 11 Broadway, New York.—"Smithson" safety port holes. Representative: H. G. Mullen. Booth 61.

J. S. Mundy Hoisting Engine Company, Newark, N. J.—Hand steerer; 4½-inch by 6-inch ash hoist. Representatives: C. L. Mundy and C. H. Foster. Booth 184.

The National Malleable Castings Company, Cleveland, Ohio.—Naco anchor chain, shackles, swivels and clinch rings. Representatives: Benjamin Nields, Jr., W. C. Lewis, R. E. Valentine, Floyd Snyder. Booth 161.

New Process Chemical Company, Inc., 114 Liberty Street, New York.—Marine glues; copper paints; bituminous solution and enamels; anti-corrosive and anti-fouling paints; bilge cement; boot topping and topside paints; hull seam composition; canvas waterproof paint. Representatives: Wilder Gutterson, Miss M. E. Granier, August Schlueter, Lew Strawser. Booth 233.

Newport News Shipbuilding and Dry Dock Company, Newport News, Va.—Shipbuilding and ship repairing. Representative: J. P. Kiesecker. Booths 123, 124, 139 and 140.

Northern Fire Apparatus Company, Minneapolis, Minn.—Rotary pump for oil and molasses. Representative: John A. Hense. Booth 228.

O'Beirne Brothers and Lyons, Inc., 319 West 42d Street, New York.—Jarvis oil burner system for ships' galleys. Booth 230.

Albert T. Otto & Sons, Inc. (American representative of Fried. Krupp A. G. Germaniawerft), 101 Park Avenue, New York.—Krupp air compressors. Representative: Stuart Otto. Booth 155.

Pantasote Company, 11 Broadway, New York.—Vehisote panel boards; Pantasote artificial leather. Representative: W. A. Lake. Booth 162.

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Peabody Engineering Corporation, 331 Madison Avenue, New York.—Peabody "Fisher" wide range mechanical oil burner. Representatives: J. P. Leask and J. M. Ferry. Booth 154.

Pneumercator Company, Inc., 25 Park Row, New York.—Pneumercator ship's draft gage; tank gages; electric whistle operator. Representatives: Gardner Cornett and Harry S. Parks. Booth 14.

Power Specialty Company, 111 Broadway, New York.—Complete superheater element with core and method of closing hand hole opening in header. Representatives: J. J. Nelis, J. C. McKenzie and F. Glander. Booth 153.

Pyle-National Company, 30 Church Street, New York.—Turbines, turbo-generators, searchlights and fans. Representatives: J. D. Sarles, Carl S. Geis, J. L. Reese and Chas. G. LeFevre. Booth 102.

Row & Davis Engineers, Inc., 90 West Street, New York.—Paracoil evaporators; Paracoil new type feed water heater; Paracoil oil heaters and coolers; RanD system for bunker oil. Representatives: R. R. Row, H. C. Davis and P. O. Kopf. Booth 104.

Scovill Manufacturing Company, Waterbury, Conn.—Seamless brass, bronze, nickel silver and copper tubing; rolling and wire mill products; brass goods. Representative: Philip Davidson. Booth 111.

Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.—Electric winch for ships and piers. Representatives: A. J. Barnes, F. A. Hatch, R. H. McGredy, R. W. Hurst. Booth 126.

The Sperry Gyroscope Company, Manhattan Bridge Plaza, Brooklyn, N. Y.—Sperry helm angle indicator: Sperry electro-magnetic clutch; Sperry continuous speed recorder; Sperry searchlight; Sperry gyro-compass; Sperry gyro-ship stabilizer; Sperry electric log. Representatives: Robert B. Lea, O. B. Whitaker, J. R. Conover, C. D. Johnson and H. A. McDonell. Booth 15.

Stamford Foundry Company, Stamford, Conn.—"Shipmate" ranges. Representative: Frank W. Brant. Booth 226.

B. F. Sturtevant Company, Hyde Park, Boston, Mass.—Battleship and scout cruiser forced draft units; 5 K. W. gasolene engine generating set; 9 by 8 vertical steam engine; turbine for auxiliary pump drive; portable ventilating set. Representatives: Eugene B. Williams, Edward L. Moran. Booths 94 and 95.

Sun Shipbuilding Company, Chester, Pa.—Photographs and models. Representatives: J. T. Borden and J. W. Hudson. Booths 76, 77, 100 and 101.

The Superheater Company, 17 East 42nd Street, New York.—Model of the Elesco fire tube superheater as applied to the Scotch marine type of boiler; model of the Elesco superheater as applied to marine watertube boilers and boilers used on river boats; steam pyrometer for measuring steam temperatures; Elesco boiler feed pump. Representatives: George C. Fuller, Adolph Starr, George E. Kershaw, Walter L. Lovekin, H. B. Oatley, George L. Moore, W. E. McLintock. Booth 72.

The Texas Company, 17 Battery Place, New York.—Samples of marine lubricants. Representatives: Frank J. Shipman, D. P. Quinn, J. L. Ward, H. W. Salbador, A. St. James, W. W. Hoopes, H. W. Schilling, E. A. Lobb, L. O'Malley. Booth 105.

P. S. Thorsen & Company, Inc., 81 Coffey Street, Brooklyn, N. Y.—Insulation of steam pipes and boilers. Representatives: P. S. Thorsen and A. Wood. Booth 113.

W. & J. Tiebout, 118 Chambers Street, New York.—Brass and galvanized ship hardware. Representative: John Tiebout, Jr. Booth 10.

Todd Shipyards Corporation, 25 Broadway, New York.—Models to scale of a modern ocean liner and the big six-section floating dry dock, known as No. 4, in the Robins yard. The model of the dock measures 11 feet 6 inches overall. *Tietjen & Lang Company, of Hoboken, N. J.,* and *Tebo Yacht Basin Company of Brooklyn:* scale models of a 750-horsepower Diesel marine engine with electric drive, 13 feet in length, and a turbine with gearing in position in the engine room of a steamship; model of an oil-burning fruit and passenger liner, 12 feet overall. *White Fuel Oil Engineering Corporation:* section of an oil-fired Scotch boiler and also the very latest improvements in oil burning equipment, including the new Todd burner. Representatives: J. S. Milne, William H. Raab, H. Nightengale. Booths 119, 120, 143 and 144.

United States Navy.—*Construction and repair:* Submarine *Holland,* submarine *S-1,* submarine *S-2,* submarine *S-3, Miantonomah, Cheyenne, Vermont* (old), *Vermont* (new), *South Carolina, Oklahoma, Pennsylvania, Shubrick* and *Decatur,* destroyer *Sampson,* one box of label plates, 1 stand for radio outfit, smoke helmet, gas mask. *Ordnance:* 3"/50 gun, antiaircraft; 3"/50 mount, antiaircraft; Lewis machine gun and tripod; Browning machine gun; Colt machine gun; mine and anchor; 3"/50 cartridges, dummy charge; for anti-aircraft gun; set of cartridges, 1-pdr. to 4"/50 (dummy powder charge); set of projectiles, target, 5-inch to 10-inch; set of dummy charges for above; 5-inch powder tank; 12-inch powder tank; 14-inch powder tank; range finder 1½-meter on tripod; mark XIV telescope; stadimeter; set dummy bombs; bomb sight; 21-inch torpedo. *Bureau of Engineering:* 2-kilowatt arc set; ½-ton kilowatt spark set; CW936 telephone, with loud speaker; receiving set with vacuum tube detector, amplifier and crystal detector with head telephones and battery for spark set. *Bureau of Navigation:* Paintings of heroic deeds, citations, photos showing recreational, athletic, educational and hygiene work; map of third naval district, showing piloting cable, radio station, etc. *Marine Corps:* Lewis machine gun complete; Browning machine gun, complete; Colt machine gun, complete; trumpets; slings, trumpet, dress; drum; carriage drum stick; sticks, drum, rosewood, pr.; haversack; carrier, pack; pouch, meat can; tents, shelter half; flags, rectg. red, large; flags, rectg. blue, large; guidons, USMC, silk; shoes, field, pr.; helmets, trench; respirator, gas, complete; canteen; cover, canteen, O.D.; can, meat; knife; spoon; flags, signal, 2-foot red; flags, signal, 2-foot white; flags, signal, 4-foot red; flags, signal, 4-foot, white; sling, drum, dress; flagstaffs, 3-lengths; flagstaffs, 2-lengths; rifle, Browning automatic; sling, straps, for; pistols, cal. 45; holsters, pistol, cal. 5 FL.; rifles, cal. 30, model '03 (1 for V.B. grenades); slings, 1903 model, rifle, web; bayonets, 1903 rifle; heliograph; discharger, rifle, grenade V. B. Mk. III; grenades, rifle, dummy V. B. Mk. I; grenades, hand, dummy, V. B. Mk. I; cutters, wire, intrenching; arm chest; chevron boards; German war map; German auto tank gun. *Bureau of Aeronautics:* Liberty motor and propellers. Representative: Michael D. Schaefer. Booths 1, 2, 3, 4, 5, 6, 7, 8, 66, 67, 68, 69, 70, 71, 106, 107, 108, 109 and 110.

United States Shipping Board.—50-foot model of 535-foot passenger and cargo steamer, full sized model of standard stateroom and other features of Shipping Board activities. Booths 50, 51, 52, 53, 54, 55, 56 and 57.

Valentine Company, 456 Fourth Avenue, New York.—Valspar varnish; Valspar varnish stains; Valspar enamels. Representative: Dorning Walker. Booths 64 and 65.

Victor Engineering Company, Philadelphia, Pa.—Victor steam jet ash ejector (model and full sized machine). Representatives: Eugene Hahn and C. L. Bachman. Booth 191.

Wager Furnace Bridge Wall Company, Inc., Singer Building, New York.—Wager patent bridge wall for Scotch marine and watertube boilers. Representatives: Louis F. Fenwick and Alexander Halley. Booth 117.

Wailes-Dove-Hermiston Corporation, 17 Battery Place, New York.—Bitumastic and hermastic bituminous compositions; bitumastic colored paints. Representatives: Linden Stuart and others. Booth 137.

Elisha Webb & Son Company, 136 North Front Street, Philadelphia, Pa.—"WebbperfectioN" marine cooking and lighting apparatus. Representatives: Elisha Webb, Jr., and James Hampton Webb. Booth 59.

Western Union Telegraph Company, 195 Broadway, New York.—Booth 39.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Model reduction gear; radiophone demonstration; motion pictures. Representatives: W. H. Easton, D. D. Faris, N. R. Sibley, G. H. Jaspert, W. E. Martin, C. C. MacMillan. Booths 78, 79, 98 and 99.

C. H. Wheeler Manufacturing Company, Philadelphia, Pa.—Single stage Radojet air pumps; double stage Radojet; intercondenser Radojet; Navy type condensate pumps; dynamometers for testing Diesel engines; also accessories to the above. Representatives: C. H. Lang, M. J. Mullan, J. Dobson. Booth 13.

The D. T. Williams Valve Company, Cincinnati, Ohio.—Marine valves; regrinding globe, angle and check valves; gate valves; cocks and fittings in medium and extra heavy types; lubricators; oil and grease cups, steam traps, etc. Representatives: Chas. J. Clark and H. J. Frincke. Booth 183.

C. A. Woolsey Paint & Color Company, Jersey City, N. J.—Copper paints, marine paint specialties; spar varnish. Representatives: Percy Varley and E. D. Kelly. Booth 62.

Worthington Pump & Machinery Corporation, 115 Broadway, New York.—Centrifugal and steam pumps. Some rather new and novel designs of centrifugal boiler feed and circulating pumps. Representatives: M. L. Katzenstein and W. A. Cather. Booth 146.

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New Devices Exhibited at the Marine Exposition

Locking Device for Stockless Anchors

THE stockless anchor locking device produced by the American Steel Foundries, Chicago, described in detail on page 602 of the August issue of MARINE ENGINEERING AND SHIPPING AGE, will be exhibited with other products of this company at the Marine Exhibition.

Valspar Varnish Combined With Transparent Color

THE Valentine Company, New York, will exhibit a new product—a combination of Valspar varnish and transparent color, known by the term "Valspar varnish stain," at the Marine Exposition. These stains are in six different shades, mahogany, walnut, light oak, dark oak, cherry and moss green. Valspar varnish has certain heat and water resisting qualities and it is claimed that the new varnish stains have the same properties. The use of the stain is intended to eliminate the necessity of first staining a surface and then varnishing it to get the required finish.

Steam Nozzle Takes Place of Pump in New Type Ash Ejector

AN ash ejector, which is operated by a specially designed steam nozzle with a consequent reduction in steam losses, has recently been produced by the Victor Engineering Company, Philadelphia, Pa. A special feature of the ejector due to the absence of a pump is that the danger of flooding the boiler room is eliminated.

In operating the mechanism a single stroke only is necessary to turn on the steam, open the seagate and uncover the hopper, while a single return stroke will reverse the operation. The ash hopper on the ejector is considerably reduced in size so that it is kept level with the floor. This hopper will receive clinkers up to 5 inches before they enter a 6-inch pipe. Complete details of the apparatus will be published in a later issue of the magazine.

Marine Lighting and Ventilating Apparatus

THE Pyle-National Company, Chicago, will exhibit a new combination search and flood light, and a portable ventilating turbine fan among other equipment at the Marine Exposition.

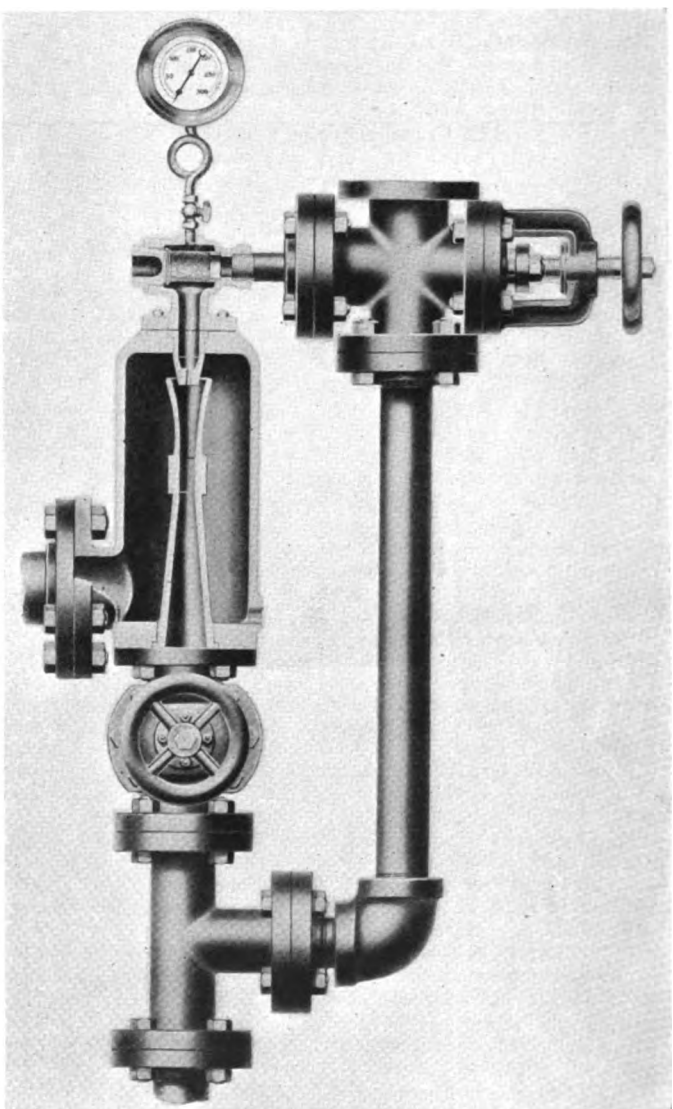
The combination search and flood light was given a series of tests in the Erie Canal service to determine whether or not navigation on the canal could be made safer at night. Because of a wide flood ray of light through which a powerful beam is projected, showing a boat 800 to 1,000 feet away, the new light has been found useful for this service. It is claimed that local harbor and river navigation is made easier and that time is saved in landing by the use of this light. This combination light is supplied with or without a pilot house control.

The Pyle-National Company has also applied small type steam and air driven turbines manufactured by the company to ventilating and exhaust fans especially designed to eliminate gases in oil tanks and in other service where a portable fan can be operated.

Apparatus Designed to Increase Evaporator Efficiency

DURING periods of reduced capacity the efficiency of evaporators drops and to overcome this the Griscom-Russel Company, New York, has designed a device known as the G-R regenerative compressor which will be shown at the Marine Exposition.

Efficiency in an evaporator depends on the pounds of distilled water produced per pound of steam in the coils of the evaporator. The regenerative compressor boosts the efficiency by compressing and delivering to the evaporator coils a portion of the vapor taken from the evaporator. This vapor, together with a certain amount of boiler steam, makes up the total steam required for evaporaor operation; otherwise this total steam would have to be supplied by the boiler. Latent heat that would ordinarily be wasted overboard in the distiller or condenser circulating water is thus made use of in the compressor to increase the efficiency.



Regenerative Compressor Used in Connection with Evaporator

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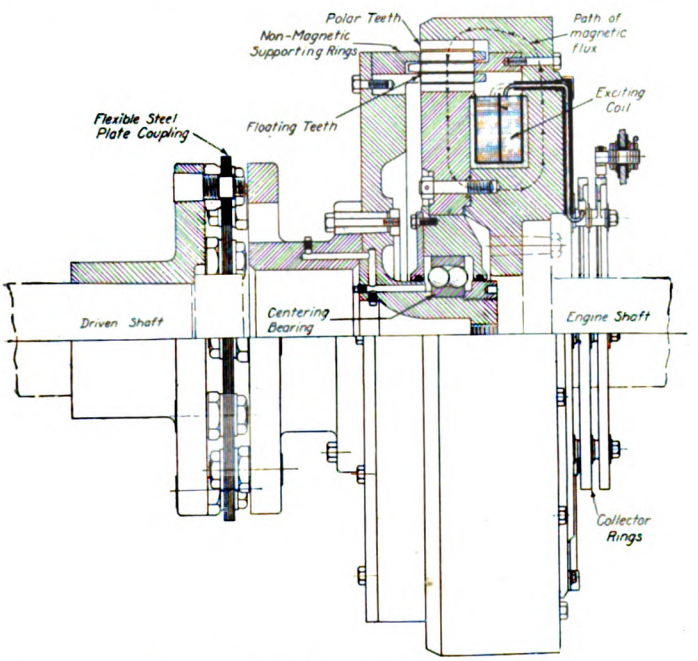
Sperry Develops New Devices for Ship and Engine Control

IN addition to the regular products of the Sperry Gyroscope Company, Brooklyn, N. Y., with which marine engineers and naval architects are in general familiar, this company will exhibit at the Marine Exposition a new type Sperry helm angle indicator, a Sperry electo-magnetic clutch and a Sperry continuous speed recorder.

The helm or rudder angle indicator shows at all times the exact position of the rudder of the ship and acts as a visible check on the rudder-operating mechanism. Two types of instruments have been developed, one of which, the rudder angle indicator, is used to meet naval specifications. Both instruments have the indicator hand directly connected to the shaft of a self-synchronous direct current 110-volt motor which is controlled by a transmitter connected to the rudder stock. The naval type rudder indicator is provided with face markings and indications in units of 1 degree up to 5 degrees on either side of the center and from 5 to 35 degrees indications are given in units of 2½ degrees. The merchant marine type of instrument is provided with dial readings conforming to standard practice in merchant marine terminology; that is in units of 2½ degrees up to 10 degrees and from 10 degrees to 35 degrees in units of 5 degrees.

MAGNETIC CLUTCH COUPLING

The Sperry type of magnetic coupling or clutch was developed as a result of several years' experiment with electric



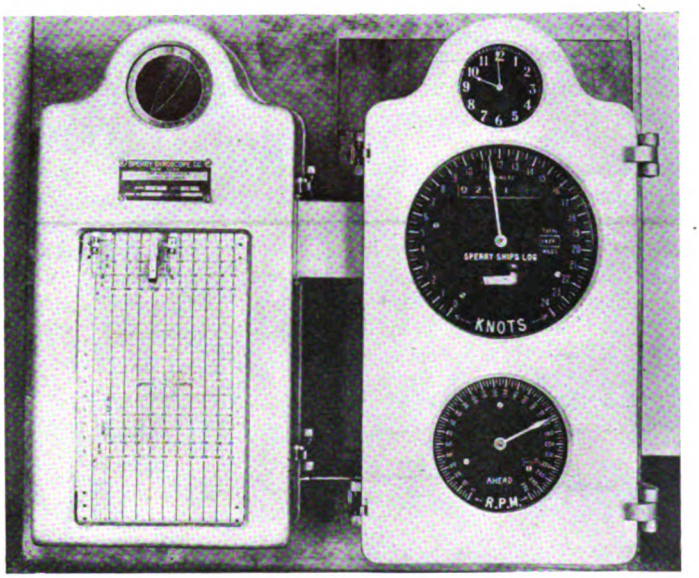
Details of Magnetic Clutch Coupling

transmission for automobiles. For marine use it is adapted to transmit power from Diesel or oil engines, to operate air compressors, to connect synchronous alternating current motors to their load and tandem connected alternating current generators to their source of power. It is built in a large range of sizes and used to provide a flexible self-alining clutch for power transmission. The half coupling, carrying floating teeth, is ordinarily centered by a sleeve or ball-bearing projection from the opposite half of the coupling. This centering projection maintains a normal condition of the air gap and prevents exterior forces due to shaft mis-alinement or other conditions disturbing the proper relation of the coupling parts. The energizing coil of the coupling consists of a single circular coil of relatively large size wire which is wound in a form and impregnated with Bakelite.

The standard couplings are designed to be operated at a potential of 110 volts direct current, although exciting coils may be wound for any voltage up to 500. The clutch is energized by the pressing of a button, and the driven part is gradually speeded up and brought into synchronism with the driving part. After the clutch is synchronized no slipping takes place unless a load is thrown on the clutch greatly exceeding its rated capacity.

CONTINUOUS COURSE AND SPEED RECORDER

The continuous course and speed recorder, developed by the Sperry Company is run from the gyro-compass and



Continuous Course and Speed Recorder

is an improved type electric log to give visual indications of the actual speed, desired speed, trip mileage and average propeller revolutions. This device also makes permanent records on a graph paper running for a period of sufficient length to cover an entire month's record showing exact compass courses maintained and any variance due to the quartermaster's steering ability.

Electrical Fixtures for Marine Service

TO prevent the stealing of electric lamps and brass guards aboard ship the Horne Rim-Lok guard for watertight electrical fixtures has been developed by the Horne Manufacturing Company, Jersey City, N. J., to clamp the guard to the fixture base. This guard is not threaded, but fitted with a groove that snaps over a projecting rim on the fixture. When locked, the guard cannot be pulled off, but still it is free to turn. The looseness of the fit between the guard and the fixture overcomes the effect of corrosive action experienced in types where the guard is screwed in place. The new type guard can be unlocked and removed regardless of the length of time that it has been in service.

NEW TYPE REFLECTOR

A new development of cargo reflectors or light clusters, adapted to use a single nitrogen lamp of 750 watts capacity, will also be shown at the Exposition. It is claimed that the candlepower shed by this reflector, known as the Horne "Nitrolite," is more than double that of a 6-light cluster of 60-watt lamps. Three different styles of frames are used, one to concentrate the light rays directly downward, another to concentrate the light rays in a horizontal direction and a third to shed light rays downward in every direction except

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upwards. This latter type is used to advantage during construction and repairs in shipyards and dry docks for illuminating closely confined spaces and holds.

AUTOMATIC RUNNING LIGHT INDICATOR

The Horne automatic running light indicator or marine tell-tale indicator is arranged with removable panels for each running-light circuit so that any panel may be removed for repairs without interference with other circuits. The indicator has a three-pole switch on each panel which is normally thrown to conform with No. 1 lamp; upon failure of this lamp the reserve, or No. 2 lamp, is automatically thrown in circuit by the relay. Simultaneously the indicator lamp on the tell-tale board is lighted, a buzzer is sounded and a further visual signal is given by means of a radium-lettered indicator card attached to the relay armature. Thus three distinct warning signals are provided which remain evident until the switch is thrown to conform with No. 2 lamp which has been temporarily placed in circuit.

A new Horne "Fuze Klip" circuit breaker to be inserted between standard fuse clips has been developed for use in place of refillable fuses. When a circuit is overloaded the new circuit breaker opens the circuit; then to re-establish the circuit it is only necessary to reset the breaker. The copper and carbon contacts of the breaker have the proper carrying capacity, and the arc is snuffed out by a magnetic blow-out coil.

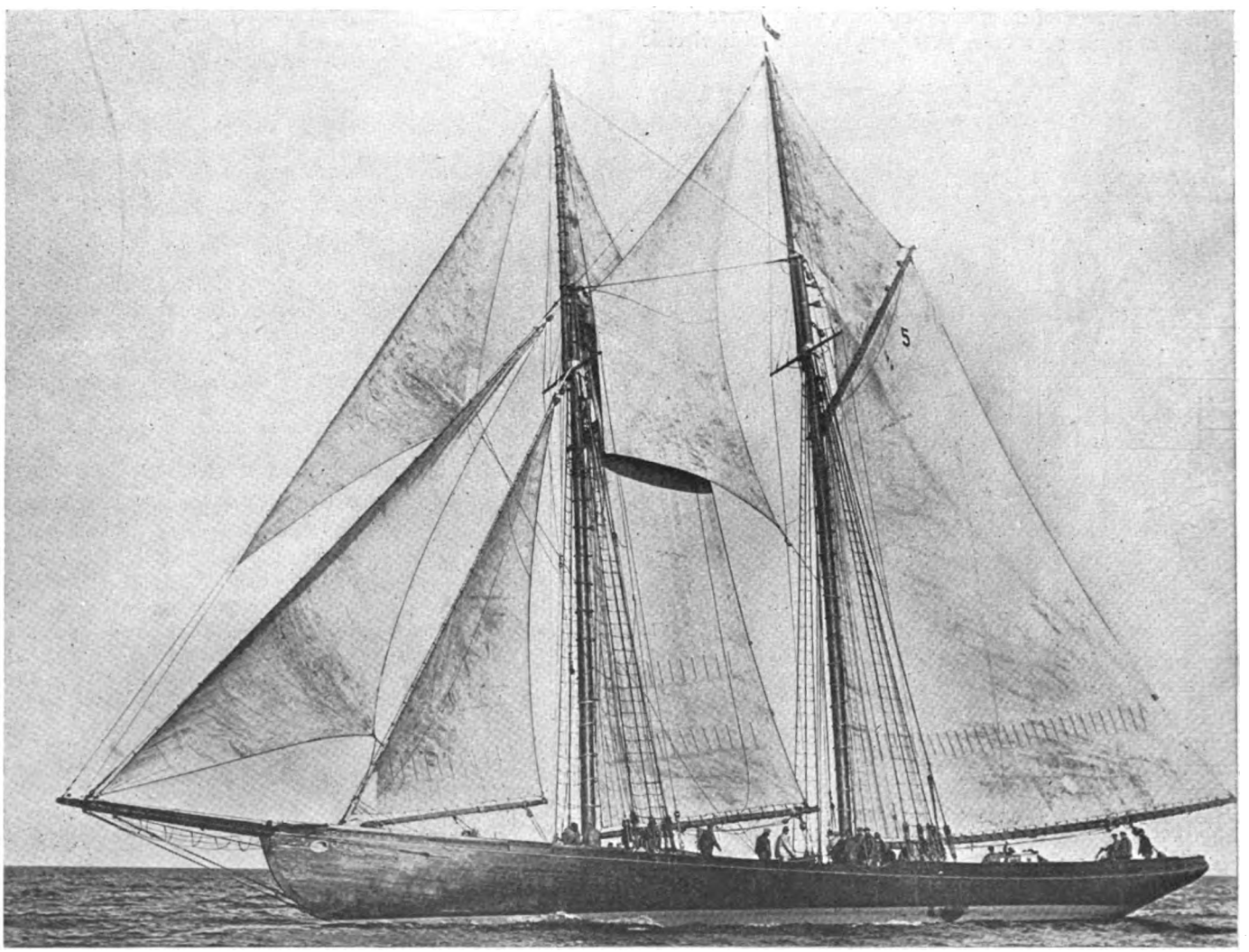
Canada Wins Fishermen's Trophy

IN two one-sided races on October 22 and 24 the Canadian speedy fishing schooner *Bluenose* regained for the Halifax fishing fleet the North Atlantic fishermen's cup won last year for the United States by the *Esperanto* of the Gloucester fleet.

The American defender this year was the *Elsie,* a vessel that in preliminary elimination trials had proved herself the speediest of the Gloucester fleet. She was a smaller vessel than the *Bluenose,* however, and although a fast contender while reaching in the lighter breezes, she was unable to match the close pointing and driving power of her rival in windward work. The *Bluenose,* built in a Lunemburg yard after designs by W. J. Roue, was sailed by Captain Angus Walters. The *Elsie* was handled by Captain Marty Welch who won the cup for the United States a year ago with the *Esperanto.*

BLUENOSE THE FASTER BOAT

The first race was marred by an accident when the fore topmast of the *Elsie* was carried away which put the American defender hopelessly out of the race. The second race was sailed without mishap or error and proved conclusively that the Canadian boat was too strong for its opponent. The superb handling of both vessels at all times fully upheld the time-honored traditions of the North Atlantic fishing fleets and added lustre to the well-earned reputation of these hardy seafarers for seamanship and sportsmanship.



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Fishing Schooner Elsie, of Gloucester, Chosen to Defend the Silver Trophy Won Last Year by United States Fishermen in Competition with Canadian Fishermen

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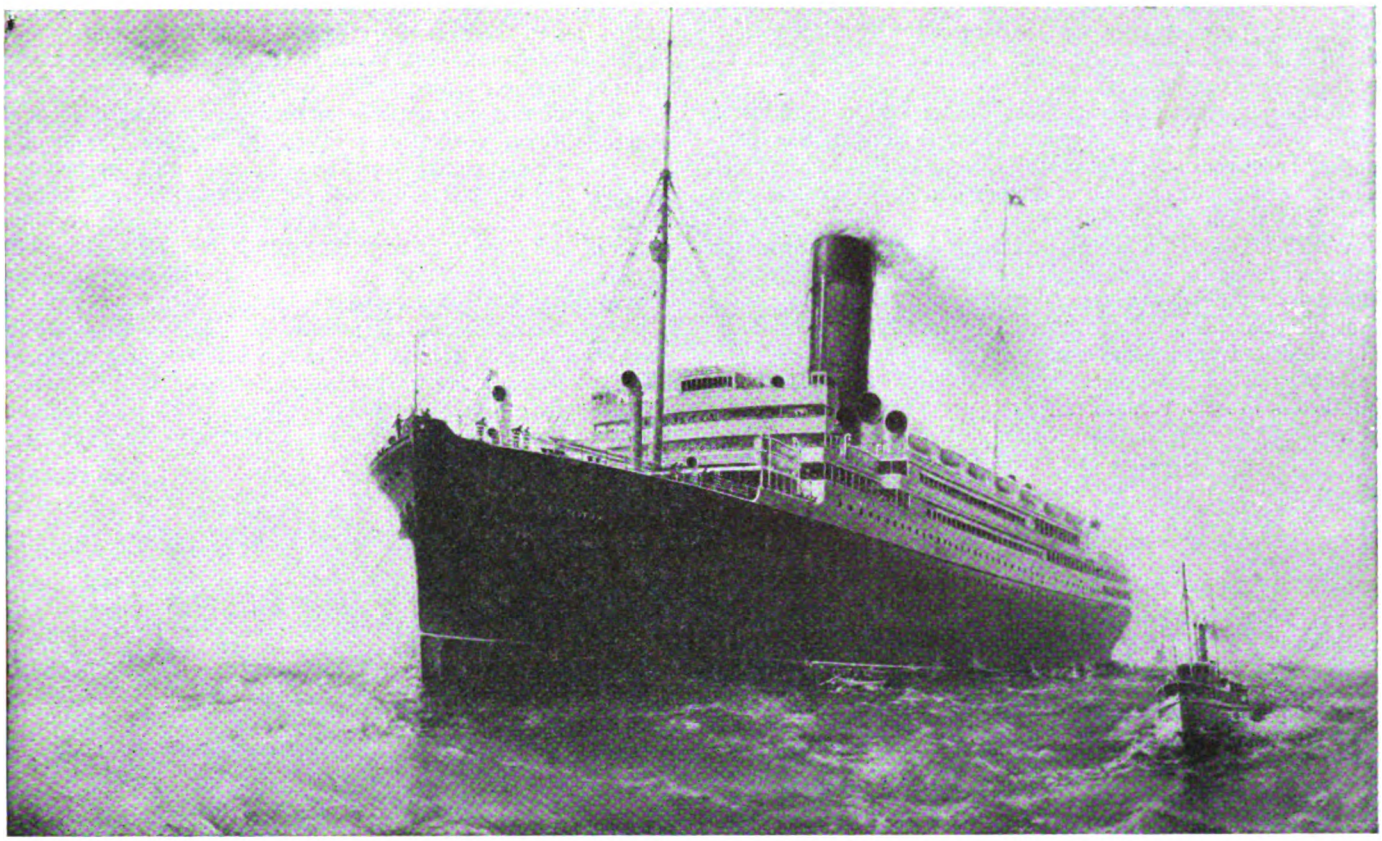

New Cunard Liner Scythia

England's Latest Type of Ocean Liner, The Scythia

Among a number of foreign steamship companies which are constructing passenger liners to meet the world's shortage of this type of vessel, the Cunard Line stands predominant with contracts for twelve new liners, the last to be delivered by the end of next year. These vessels will all be of the intermediate type and will include five of 20,000, *one of* 16,700, *and six of* 15,000 *gross tons. The Scythia is the first of the* 20,000 *ton ships to be completed and is the largest Cunarder built since the war.*

THE new liner *Scythia,* which left Liverpool August 20 for her initial run in the Cunard passenger service between New York and Liverpool, represents the latest type of intermediate passenger liner especially designed to meet general post-war shipping conditions.

Not only is the *Scythia* the largest new Cunarder built since the war, but she is up to the present the largest passenger carrying vessel on the Atlantic especially designed and built to burn fuel oil and possessing propelling machinery of the latest double reduction geared turbine type. Various new features have also been introduced in her passenger accommodations, several of which appear for the first time on a Cunarder of her size. Among these are included the garden lounges for saloon, veranda cafe for second class and the numerous two-berth cabins for third class passengers.

The new *Scythia* is the second vessel of this name to be operated by the Cunard Company and a comparison of this modern vessel with the former one conveys an idea of the remarkable progress made in the science of naval architecture in the past fifty years.

First Scythia

The first *Scythia* was a vessel of 4,556 tons and was built on the Clyde. She was a vessel 432 feet long with a beam of 42 feet 6 inches, a depth of 36 feet and contained four decks and seven watertight compartments.

Accommodation was provided for 300 first class and 1,000 second and third class passengers.

Great interest was aroused at the time of her first voyage because of the fact that a new method of lighting, consisting of the American sperm oil lamp, was used for the interior of the ship and that the saloons and sleeping apartments were fitted with electric bells communicating with the stewards' pantry.

The Modern Scythia

The new *Scythia* represents the latest practice in the science of building ships and belonging as she does to the intermediate type of vessel is roomy, steady and of moderate speed. She was built in the yards of Vickers, Ltd., Barrow-in-Furness.

An attempt has been made to provide the greatest possible comfort in passenger accommodations and the furniture of her large public rooms and staterooms has been specially designed with this end in view.

The principal characteristics of the vessel are as follows:

Length, over all	625 feet 0 inches
Length, between perpendiculars	600 feet 0 inches
Breadth, molded	73 feet 6 inches
Depth, molded to "D" deck	45 feet 0 inches
Depth, keel to top of funnel	140 feet 0 inches
Draft, loaded	30 feet 5 inches
Speed, average sea	16 knots
Gross tonnage	20 000 tons
Displacement	27,000 tons

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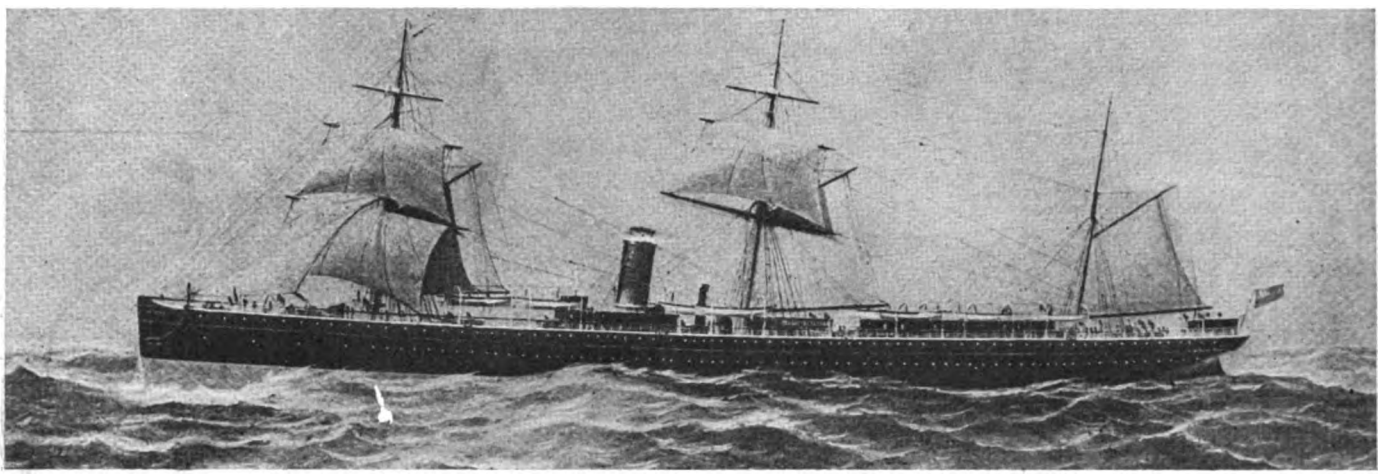
The vessel is classed 100-A1 at Lloyds, shelter deck with freeboard, special survey, and will meet the requirements of the British Board of Trade and American authorities in all respects as a passenger vessel.

Careful consideration was given the watertight subdivision of the vessel and in this respect the regulations of the International Convention of Safety of Life at Sea have been met. There are eight decks and a double bottom which has been carried well out up the bilge.

Where doors are fitted in watertight bulkheads, provision has been made for operating either by hand or by the Stone-Lloyd hydraulic power system, all arrangements being such that the operations may be controlled from either side of the bulkhead or from the navigating bridge.

Above the bulkhead deck the vessel is divided by fire screen bulkheads in such a manner that in the event of fire in any portion of the ship that particular part can be isolated from the rest of the vessel by closing the fireproof doors in the fire screen bulkheads bounding that compartment, thus preventing the fire from spreading to other parts of the ship.

The actual extinguishing of the fire is accomplished by the use of carbon dioxide which is stored in cylinders and operated on the Gronwald system. A good supply of fire hydrants and hose is also provided.



The First Scythia, of 4,556 Tons, Built on the Clyde in 1875

ACCOMMODATIONS

Provisions have been made aboard the *Scythia* for accommodating 337 first class, 331 second class and 1,538 third class passengers and a crew of 409, making a total accommodation for 2,615 persons.

Every endeavor has been made to provide the greatest possible comfort for the passengers and the furniture of the large public rooms and staterooms has been specially designed to this end. The decoration of her accommodations represents the work of artists and craftsmen of the greatest skill and each public room with its furniture and appointments forms a complete picture in which everything has been worked out to the smallest detail.

New features are continually being introduced in the modern liner which tend to increase the comfort of the passenger. One of these is the garden lounge. In the *Scythia* saloon passenger accommodations there are two garden lounges, one situated on the port and the other on the starboard side of the "A" or promenade deck. Here passengers may enjoy the sun and sea air among surroundings typical of an old English garden fitted with many comfortable wicker chairs. Large sliding glass windows are fitted in the side of the vessel in way of the garden lounges and add to the comfort of this space by providing means for shutting out cold winds and rain.

The main staircase leads to an imposing central hall with approaches to the saloon, drawing and writing room, lounge and smoking room. This grouping of the public rooms should prove of great convenience to passengers.

The lounge is particularly attractive. In plan it is oval with an imposing central dome of white glass. There are four alcoves diagonally opposite each other and the massive fireplace and marble mantlepiece is surmounted by a picture in the style of the period. The furniture and the appointments of the room present a most attractive color scheme in black and gold, grey and gold, with here and there touches of vermillion, the rich effect being toned down by a number of pieces of furniture in old mahogany. The coverings are in black and gold and blue and gold with charming Chinese designs, while grey velvet is also introduced into the scheme. Chinese silk of blue and gold is the material used for the curtains while a reseda green pile carpet completes the successful effort to provide a general representation of the best work produced during the latter part of the eighteenth century.

The drawing and reading room is extended at each end athwartships by an alcove and the main feature of this room is the elliptical dome for the center portion finishing with a fan shaped painted panel on either side. The color scheme of the walls and ceiling is white while the appointments are in the modern style, but showing an influence of the Georgian period. The Adam furniture is of dull old mahogany and the silk coverings form a unique color scheme of purple and yellow. An open fireplace adds a sense of comfort to the room and opposite this there is a handsome carved mahogany bookcase.

The smoking room is a cozy compartment consisting of a center room with a coach top roof and two side wings. Its furniture is of the plain Chippendale type with Chinese fretted detail. Large settees and easy chairs are covered in a reproduction of an early English, eighteenth century version of Chinese tapestry. The room is panelled throughout with antique oak.

The dining saloon for the use of first class passengers is situated on the "E" deck. It extends the full width of the ship for a length of 64 feet. Walls and ceilings are treated in white decorated plaster and in the center is a richly decorated, pierced dome. Behind this dome is the musician's gallery. The long tables of the past have given way to small tables with portable four legged chairs which are now so popular among travelers and at which 2, 4, and 6 people can sit. A number of small sideboards are situated in convenient places and a large oval buffet is located in the center from which cold dishes can be served.

The first class staterooms are fitted up in a particularly

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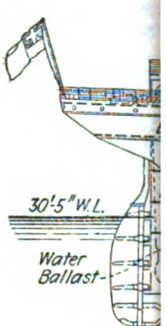

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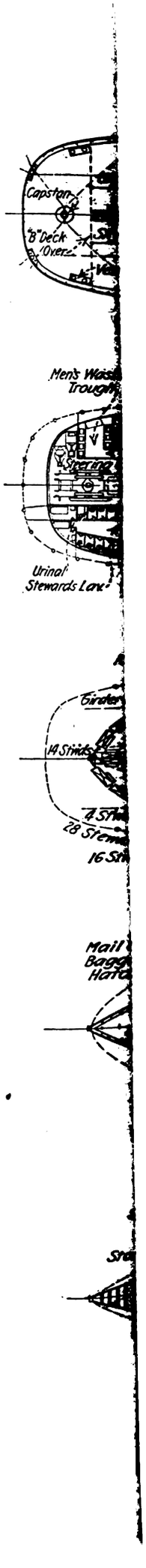

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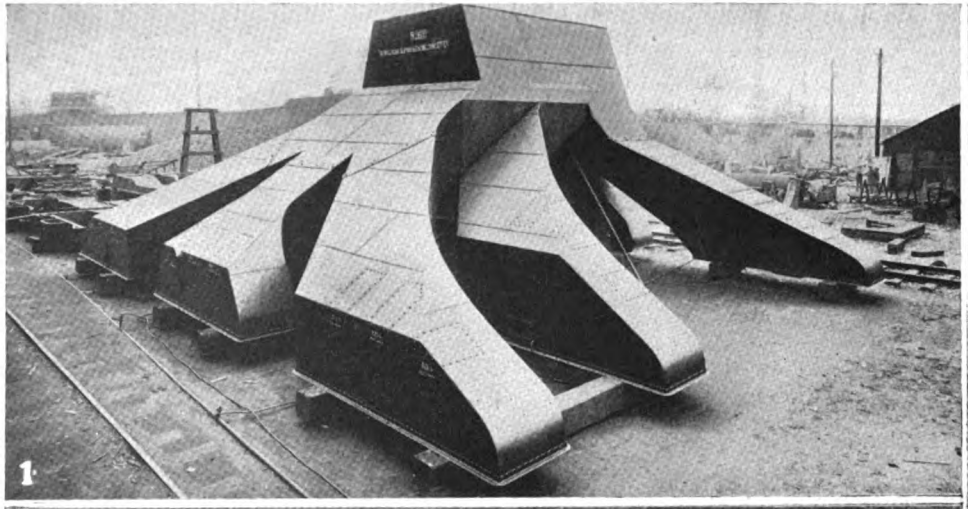

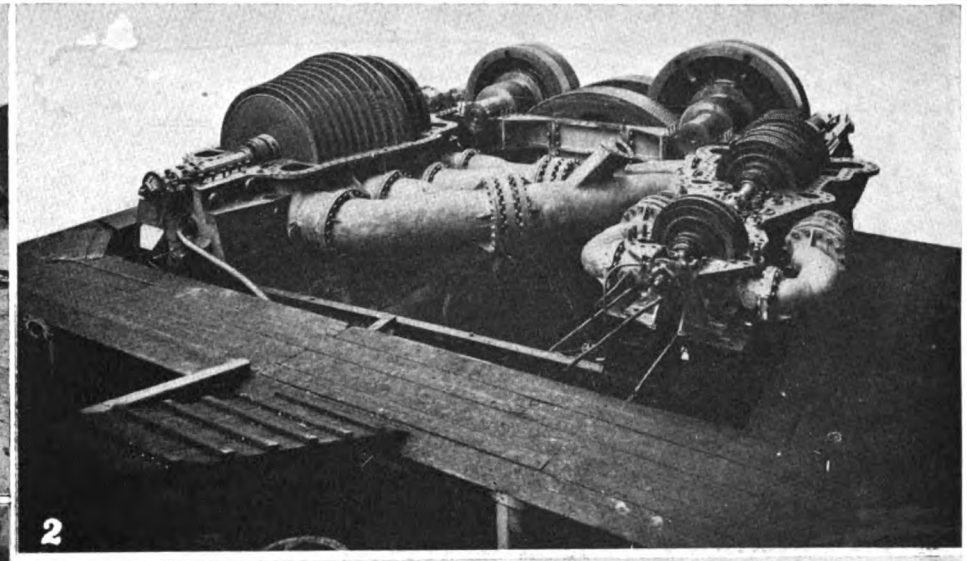

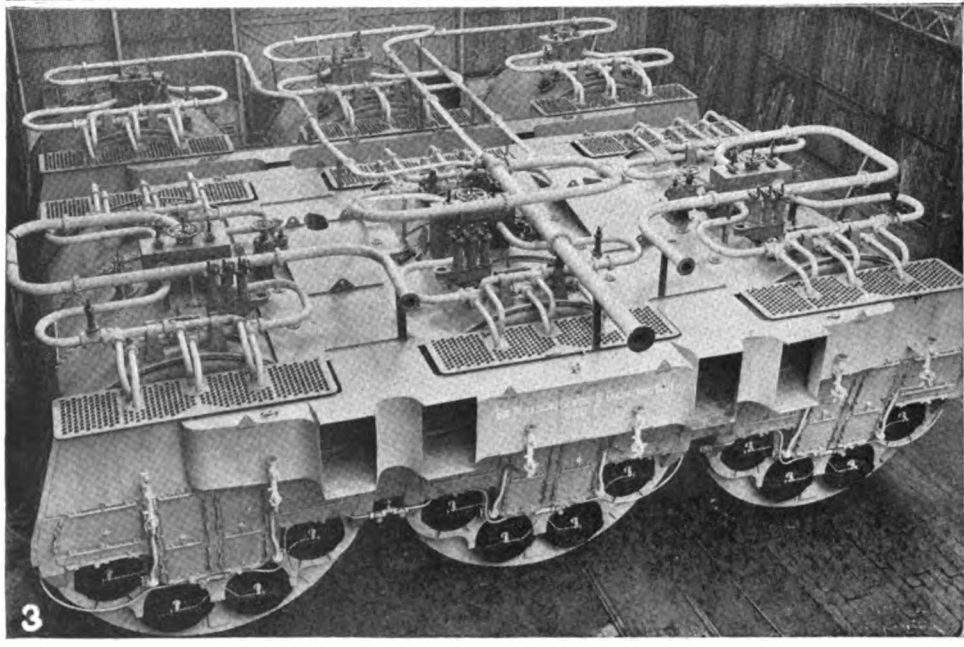

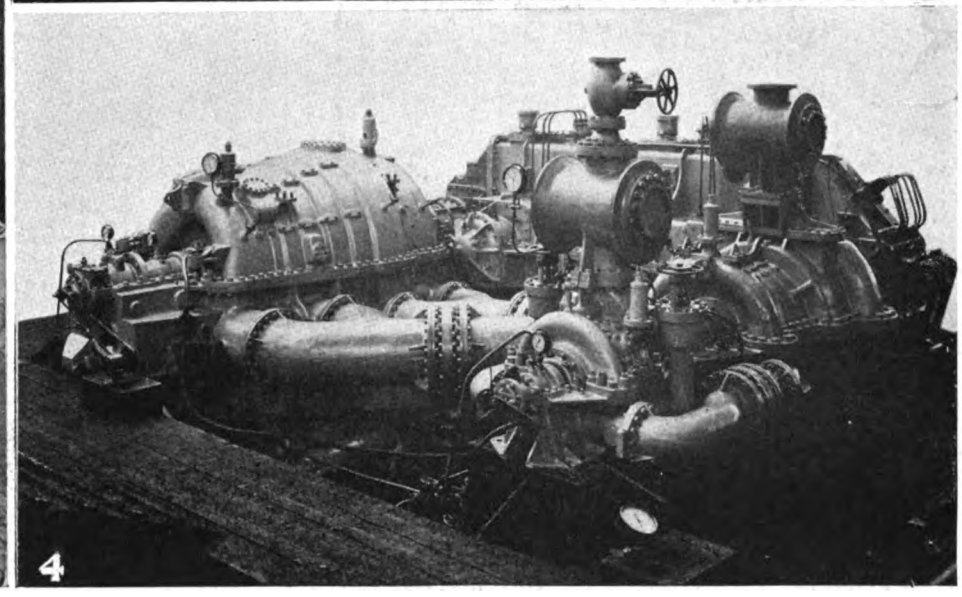

(1) Arrangement of Uptakes for the Laconia, Which Is a Sister Ship to the Scythia. (2) Steamship Scythia, Double Reduction Geared Turbine Unit with Top Housing Removed, Showing Turbine Rotors and Gears. (3) Boiler Installation for the Laconia, Sister Ship to the Scythia. (4) Steamship Scythia, Double Reduction Geared Turbine Unit

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Cunard Liner Scythia: (1) First Class Dining Saloon. (2) First Class Lounge. (3) Reading and Writing Room. (4) First Class Garden Lounge and Veranda Cafe. (5) Suite de Luxe Sitting Room. (6) First Class Smoking Room. (7) Suite de Luxe Bedroom.

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attractive manner, those on the promenade deck having wooden beds for two people with a Pullman berth which, if necessary, can be made to accommodate a third person. The furniture of these rooms is of carved mahogany and each room is fitted with hot and cold running water.

There are two private suites located forward on the "A" deck. Each comprises a sitting room, bed room, bath and vestibule. The decorative scheme is in the Louis XVI style and the color scheme of the sitting room is of green and gold while the bedrooms are treated in French grey and white. Ingeniously contrived fittings provide a large amount of wardrobe space while the rooms are free from loose furniture. These suites are so arranged that if necessary they can be entirely cut off from the general accommodation of the ship.

There are also a number of staterooms which can be booked en suite with bath.

SECOND CLASS

In that part of the ship devoted to second class passengers the comfort of the traveler has received the fullest consideration. Public rooms include a dining saloon, lounge and smoking room. In the dining saloon small tables for 4 and 6 people are provided and the oldtime sideboard has given way to a number of small quick service tables. The drawing room is finished in plain mahogany and the smoking room is panelled throughout in oak and furnished also in oak with moquette coverings of modern design. A veranda cafe overlooks the stern of the vessel thus giving the passengers an uninterrupted and sheltered view of the sea.

THIRD CLASS

Never before on any ship has such care been devoted to the design and accommodation of third class passengers. The old fashioned open berths have been entirely dispensed with and throughout the ship third class passengers are berthed in commodious rooms which accommodate two to four persons.

What is true of the third class accommodation is also true of that provided for the crew.

VENTILATION AND HEATING

The holds are ventilated by natural and the passenger accommodations by mechanical means. The thermo tank system is employed for third class rooms whereby a supply of ordinary fresh air or heated fresh air can be supplied to any compartment or cabin with means of regulating at will by the passenger. In addition, cabins, corridors and public rooms are fitted with radiators.

GALLEYS AND REFRIGERATING COMPARTMENTS

As the total number of persons carried will be 2,615, culinary arrangements have been made on a very generous scale and will include many electrically driven labor saving devices such as silent mincing machines, potato peeling and potato mashing machines, revolving dough mixing machine, bread slicer, dish washing machines, knife cleaning machines, electric hot plates, griddle plates, toasters, etc., in addition to the usual cooking ovens, steam ovens, steam cookers, boilers, bread provers, hot presses, etc. A separate galley and cooking arrangements are provided for the crew.

An extensive system of refrigerating chambers is provided on "G" deck allowing for the carriage of perishable food such as beaf, mutton, poultry, fish, milk, butter, etc., and kept at the required temperature by the electrically driven CO_2 refrigerating machinery situated in the engine room. The insulation of the refrigerated compartments consists of Delta slab cork and composition as embodied in the J. D. patent unit system of insulation. This insulation is fireproof, vermin proof and, on account of its hard and smooth finished surface, easily washed. The thicknesses of insulation required with this system are less than would be required with the old system of granulated cork, silicate cotton or charcoal, and in addition to requiring no repairs the upkeep costs are said to be negligible.

LIFE SAVING APPLIANCES

The life saving appliances have had all the attention that this important subject demands. Forty-two lifeboats are provided, which are sufficient to carry every individual aboard. These boats are handled by Welin quadrant davits, insuring quick handling of the boats, and in addition there are six electro-hydraulic boat winches which may be operated by current from the emergency motor driven generator situated on one of the upper decks. This generator can also supply current for the wireless, lighting and steering gear in the event of the main electric generators being out of action through accident.

ELECTRO HYDRAULIC POWER

The arrangements for handling cargo, maneuvering the ship and working cables comprise the very latest systems, namely, variable speed gear winches, capstan and windlass on the electro-hydraulic principle, which have been designed and installed by the shipbuilders.

Some of the features of the system may be summarized as follows: abolition of steam and exhaust pipes which are difficult to arrange in the ship and which cause heating and often leakage, most objectionable, particularly in passenger ships; fuel saving, as the steam winch is a very extravagant user of steam and as the power derived from an economical dynamo saves this steam and accordingly fuel; immediate availability, in that no time is lost in warming up steam pipes and also that in the event of the vessel requiring to be warped while steam is off the boilers, current can be derived from the emergency dynamo previously mentioned; silence through the absence of heavy reciprocating parts. Among the electrical advantages are the following: the electric starter is a simple apparatus seldom operated and in working there are no controller contactors subject to wear from sparking nor is there any danger from fire or heating due to large resistances between decks as in most ordinary electrical winches.

The rudder is operated by a Brown Brothers electro-hydraulic steering gear.

Two sets of turbo-driven generators of 375 kilowatts each are provided for supplying electric current for the various electrical equipment throughout the vessel.

MAIN PROPELLING MACHINERY

The main propelling machinery consists of turbines of the Brown Curtis type which drive twin screws through double reduction gearing. The machinery and boilers have been constructed to the requirements of the Board of Trade, Lloyds and American survey, and are capable of developing a collective shaft horsepower of 12,500 with the revolutions of the propeller shaft about 80 per minute. Provision is made on the high pressure turbines for the fitting of additional nozzles so that the shaft horsepower may be increased to 13,500.

The total power when working astern is about 70 percent of the ahead power. The turbine will operate with steam at 220 pounds per square inch with 200 degrees of superheat.

The main machinery comprises two sets of steam turbines, each set consisting of one high pressure and one intermediate pressure turbine in tandem, driving one primary pinion, and one low pressure turbine driving the other primary pinion of the gearing.

Astern turbines are incorporated in the casings of the intermediate pressure and low pressure ahead turbines, adjusting blocks of the Michell type being fitted.

The gearing is of the double helical type and the shaft bearings for the turbine and gearing are arranged to work under forced lubrication.

Thrust blocks of the Michell type are fitted on the main

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shafts next to the gearing to take up the propeller thrust.

The condensers are of the underslung type bolted direct to the low pressure turbines so that the low pressure turbine is always free from drainage water. All the latest improvements for economical and efficient operation in conjunction with the feed heating system are embodied in the vacuum system.

The main shafting is made of hydraulic forged ingot steel finished bright all over and drives propellers of the built-up type, each consisting of four manganese bronze blades secured to a propeller boss of cast steel.

BOILERS

The steam generating installation consists of three double-ended and three single-ended Scotch boilers arranged in one compartment and constructed to Board of Trade and Lloyd's requirements for a working pressure of 220 pounds per square inch. The boilers are of the multitubular return tube type fitted with smoke tube superheaters and Howden's forced draft. The mean diameter of all the boilers is 17 feet 6 inches; the mean length of the double-ended is 22 feet 6 inches and of the single-ended 11 feet 6 inches. Each double-ended boiler is fitted with eight furnaces of the Morison suspension type and eight separate combustion chambers; the single-ended boilers having four furnaces and four separate combustion chambers. Steam flue blowers are fitted to each combustion chamber.

The forced draft system includes two pairs of single inlet fans electrically driven, one motor being arranged to drive two fans.

The boilers are designed for burning oil fuel, but the fronts are arranged for quick conversion from oil burning to coal.

AUXILIARY MACHINERY

The auxiliary machinery of the vessel includes the following:

Three forced lubricators for supplying oil to the turbine bearings and gearing.

Two circulating pumps of the centrifugal type, driven by horizontal spindle impulse turbines.

Three feed pumps including one turbo-driven and two of the direct-acting type; the two direct-acting pumps together, and the turbo pump alone, being capable of supplying the boilers at full power.

Two 50-ton evaporators with automatic feed and brine ejector. The evaporators are arranged for working singly or in series.

One distiller capable of distilling 50 tons per 24 hours.

One bilge pump of the vertical duplex type.

One emergency bilge pump driven by gearing and shafting connected to an electric motor.

One sanitary or wash-deck pump and one bilge pump, arranged at the forward end of the gear case on each main engine.

One sanitary and wash service pump, electrically driven rotary type.

Two ballast pumps; one of the duplex type, and one motor driven.

One washing water pump of the duplex type.

One fresh water pump of the duplex type.

Two fresh water filters fitted with connections from the discharge of the fresh water and washing pumps.

One auxiliary centrifugal pump driven by a single-cylinder vertical engine of the forced lubrication type.

One oil fuel transfer pump.

One oil bilge well pump.

Two electric ash hoists.

OPERATING DATA

The firetube superheaters in the boilers of the *Scythia* are designed to deliver steam at 600 degrees Fahrenheit at the throttle under the gage pressure of 200 pounds per square inch. This gives the steam approximately 200 degrees superheat. Under normal operating conditions, the engines of the *Scythia* will develop 13,000 shaft horsepower, giving a service speed of 17 knots. As in the case of most vessels, however, the first two runs of the *Scythia* have been made at comparatively low speeds to properly work in all bearings and afford an opportunity to tune up the engines and boilers. On her last Atlantic crossing she maintained an average speed of 14.1 knots with the engines indicating 8,000 shaft horsepower turning at 70 revolutions per minute. For this speed the boilers and superheaters were required to deliver steam at 500 degrees Fahrenheit. The fuel consumption for the run was 95 tons of oil per day or at the rate of about 1.106 pounds per shaft horsepower per hour. Further details of the operating records of the *Scythia* will be available after her return voyage to this country, on which she will be tested under the severest service conditions.

Are You a Shipping Man, á la Edison?

(*Concluded from page* 807.)

63. How much tonnage tax does an American vessel have to pay annually?

64. Where are marine mortgages recorded?

65. What are the American Marine Insurance Syndicates?

66. Why does an iron vessel last longer than a steel vessel?

67. What is a ship's husband?

68. What is the tonnage of the Type A, Hog Island ships?

69. What famous vessel did Captain Samuel Samuels command?

70. What American yacht won the last International yacht race?

71. Where is the yacht *America* now?

72. Where is the famous old warship ***Constitution?***

73. To what does section 34 of the so-called Jones Act relate?

74. What confederate cruiser destroyed a great many American merchant vessels during the Civil war?

75. What United States vessel sank her?

76. Name four of the old established and prominent American shipyards?

77. Who built the *St. Louis* and the *St. Paul?*

78. Who built the *Korea* and *Siberia?*

79. Who built the *Mongolia* and *Manchuria?*

80. Where was the liner *Minnesota* built?

81. What American-built steamship holds the round trip record for the North Atlantic?

82. What is the basis of a nautical mile, or knot?

83. How does the speed of a vessel vary in proportion to the propulsive power applied?

84. What vessels are required by the Government to be equipped with radio apparatus?

85. Name three leading American marine insurance companies.

86. What do freight vessels, making a trip light, usually carry for ballast?

87. How are lighthouses distinguished at night?

88. How are buoys lighted?

89. What is a bell buoy?

90. What effect has shoal water on the speed of a vessel?

91. What is a derelict?

92. What are the two principal classes of derelicts, and what branch of the Government destroys or removes them?

93. What are the functions of the Coast and Geodetic Survey?

94. What cabinet officer has charge of that service?

95. Where is Scotland light, and for what was it named?

96. Why do not sailing vessels go through the Straits of Magellan?

97. What regulated the size of Shipping Board vessels, known as "Lakers"?

98. What light vessel is first picked up by steamers coming from Europe to New York?

99. Why are double bottoms used in merchant vessels?

100. Where, in this country, can the *Leviathan* be docked?

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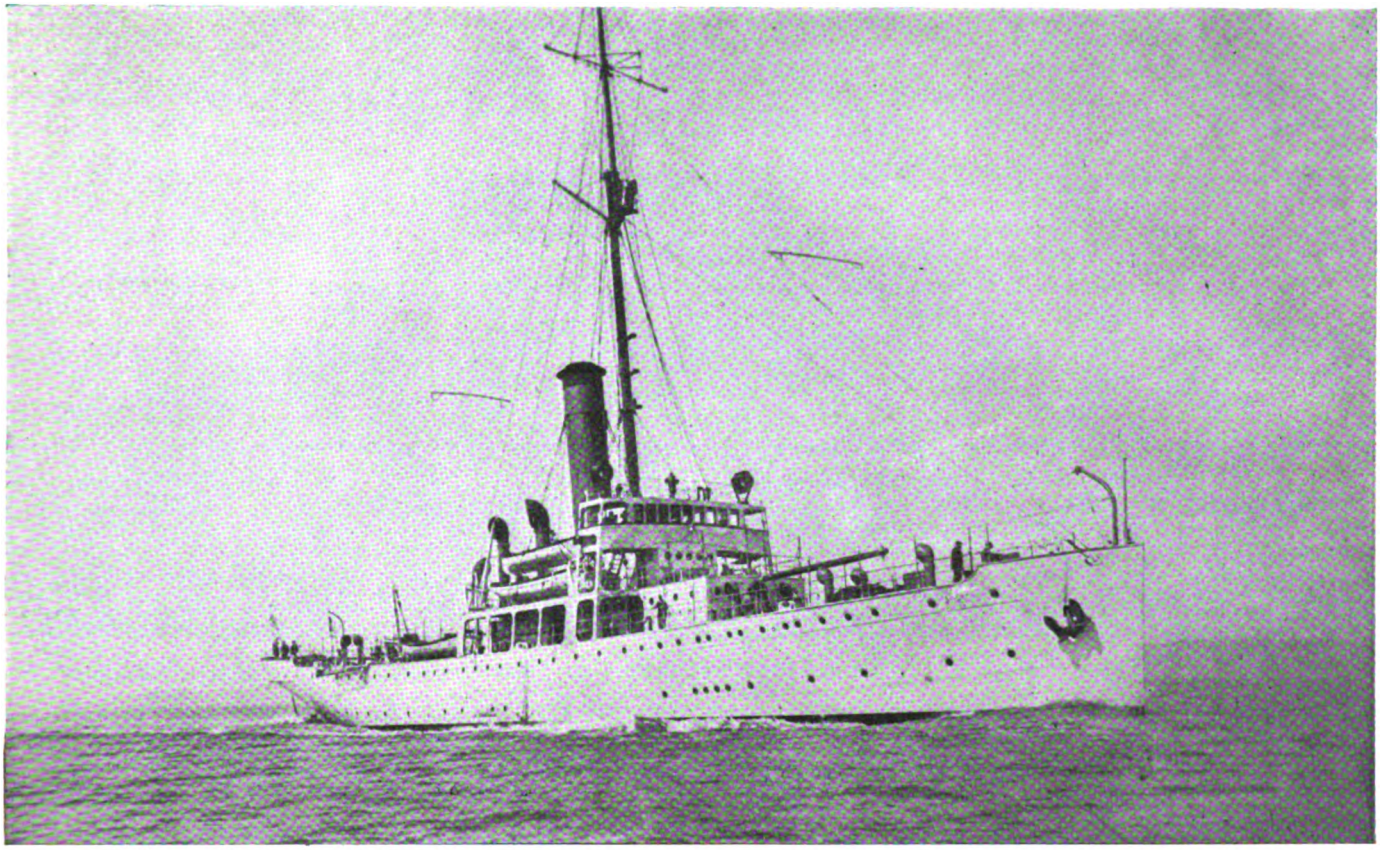

U. S. S. Tampa, the First Electrically Driven Coast Guard Cutter

First Electric Coast Guard Cutter Completed

Tampa, One of Four Revenue Vessels Placed in Service by Treasury Department, Has Successful Trial

OFFICIAL sea trials of the U. S. S. *Tampa,* the first of a series of four electrically propelled Coast Guard cutters to be placed in service by the Treasury Department, have recently been completed off the Pacific Coast with entire success.

The *Tampa* was built by the Union Construction Company, Oakland, Cal., and the electrical apparatus was furnished by the General Electric Company, Schenectady, N. Y. She is 240 feet long, with a beam of 39 feet, a depth of 25 feet 6 inches and a displacement of 1,600 tons at a mean draft of 14 feet. Her contract speed of 16 knots was exceeded during the trials, as her average speed over the measured mile was 16.3 knots.

The main propelling equipment consists of two Babcock & Wilcox oil burning watertube boilers supplying steam at 200 pounds gage pressure and 50 to 75 degrees superheat to a Curtis turbine direct connected to an alternating current generator supplying electric power to a 2,600 horsepower synchronous motor giving a propeller speed of 130 revolutions per minute.

The control equipment consists of a control group and a panel, so arranged that it can be operated either electrically or, in case of an emergency, by hand. Two exciters, one being a spare unit, furnish current for the excitation of the generators and synchronous propulsion motor and also power for driving various auxiliaries, such as the blower motor, steering gear, the gypsy, radio apparatus, refrigerating plant, laundry and lighting equipment.

"One of the most noticeable features of the full power trial," says the *Coast Guard Bulletin,* "was the absence of effort on the part of any of the operating personnel. Practically all of the machinery lubricates itself automatically, and it is necessary only to keep an eye on gages, thermometers, etc., and assure that all parts are functioning properly.

"While the boilers installed in the *Tampa* appear to be small, the power developed by the propelling machinery was 2,900 shaft horsepower throughout the trial, and the safety valves were blown about every half hour simply to show that it could be done and that the boilers furnish more than enough steam for all the requirements of the ship.

"The operating gear consists of the same two levers with which we have been familiar for several generations—one for speed control and the other for direction—and any man who is capable of 'backing and filling' with a reciprocating engine can, without additional instructions, operate the new machinery with equal facility.

"It is confidently expected that the propelling machinery of these ships will not call for even slight repairs or adjustment over a period of years."

GEORGE WASHINGTON TO MAKE MEDITERRANEAN CRUISE.—The Shipping Board has voted to carry out the contract made by the United States Mail Company with Raymond & Whitcomb by which the *George Washington* will make a tour through the Mediterranean beginning in February and returning to Cherbourg in March or April.

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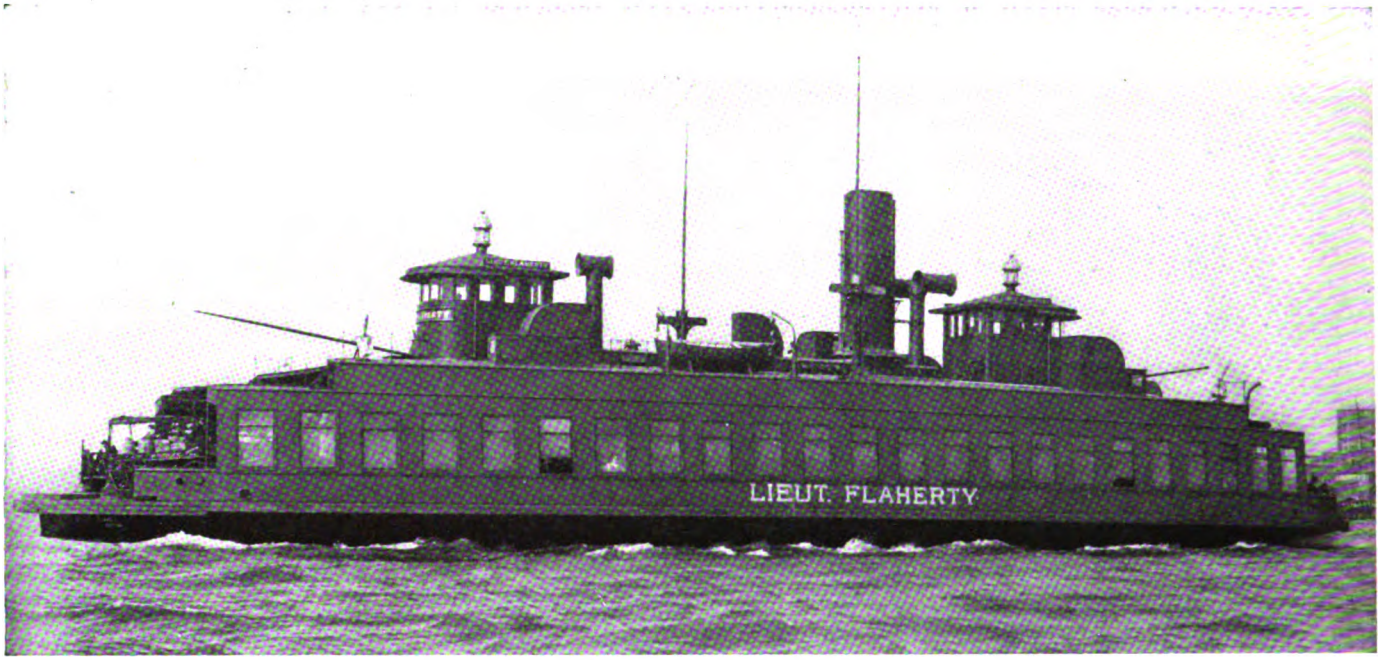


One of the New Boston Ferryboats

New Ferryboats for Boston Harbor

Two Single-Deck Passenger and Vehicle Steamers Built for East Boston Ferry—Each Boat Has Four Driveways

THE two new ferryboats of the four-driveway type recently put into service in Boston harbor to run between Boston and East Boston will add considerably to the traffic facilities in this port. That two boats so especially well fitted for the service and so thoroughly up to date were acquired was due to the efforts and foresight of Boston's Commissioner of Public Works, Mr. T. F. Sullivan.

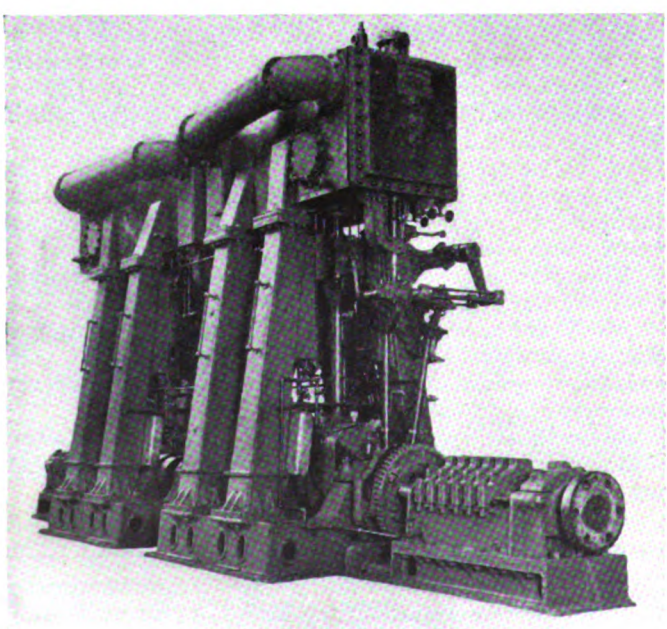
These vessels, which are named *Lieutenant Flaherty* and *Ralph J. Palumbo,* were designed by Fay, Spofford & Thorndike, consulting engineers, Boston. Associated with them were A. B. Raymond and A. L. Swasey as naval architects. Owing to other duties Mr. Swasey withdrew and the design and construction were carried out under Mr. Raymond's personal supervision. The contract for the machinery installation was awarded to the Kearfott Engineering Company, Inc., 95 Liberty Street, New York, who acted as consulting engineers for this portion of the work and were responsible for several ideas entering into its design.

The *Lieutenant Flaherty* was built at the yards of the Groton Iron Works, Groton, Conn., and the *Ralph J. Palumbo* at the plant of the Winnisimmet Shipyard, Inc., Chelsea, Mass.

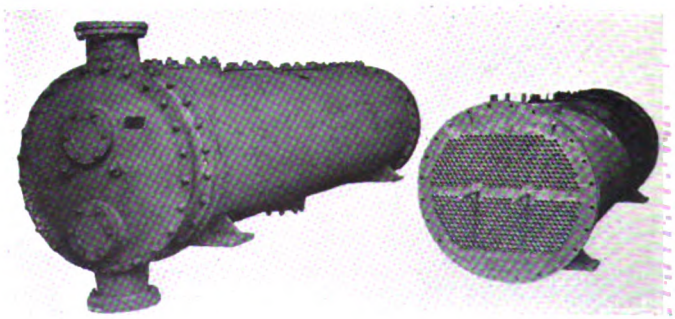
General Arrangement

The main deck of each vessel is arranged to provide four driveways, two of which are located on each side of a very narrow central monitor and on each side of the vessel outboard of the driveways there is provided a cabin for the accommodation of the foot passengers with a single row of seats extending along the inboard bulkhead.

The vessels are primarily of the single deck type of ferryboat, but the deck overhead which covers the driveways and



Main Engines



Main Condenser

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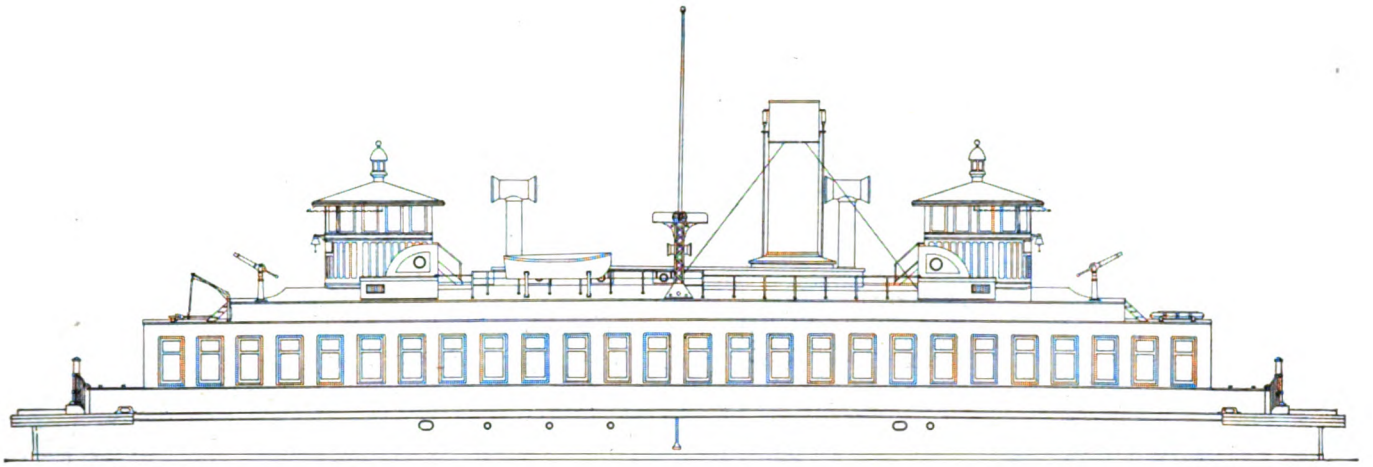
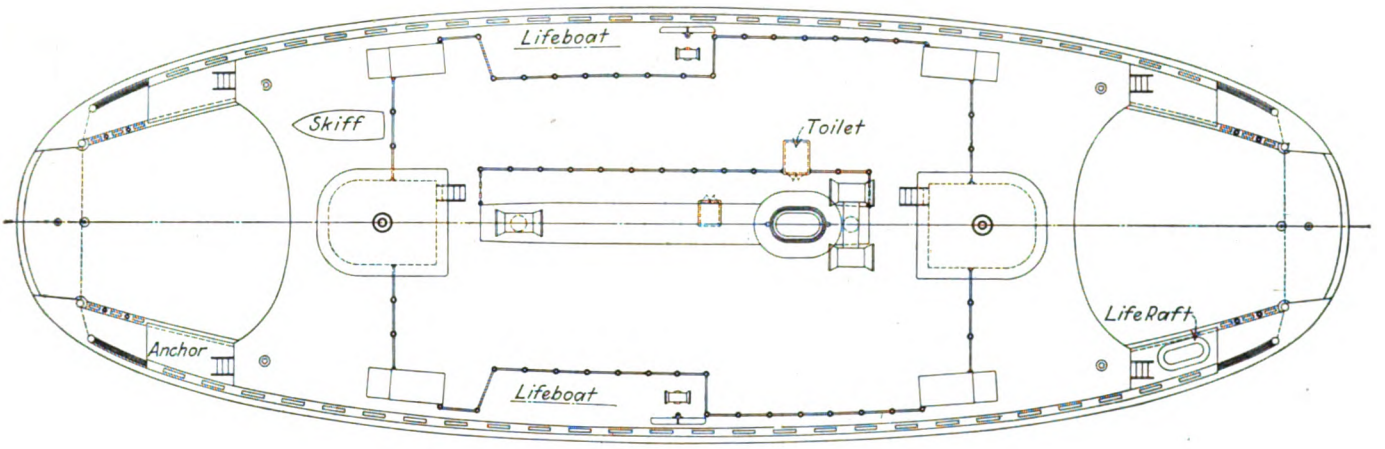
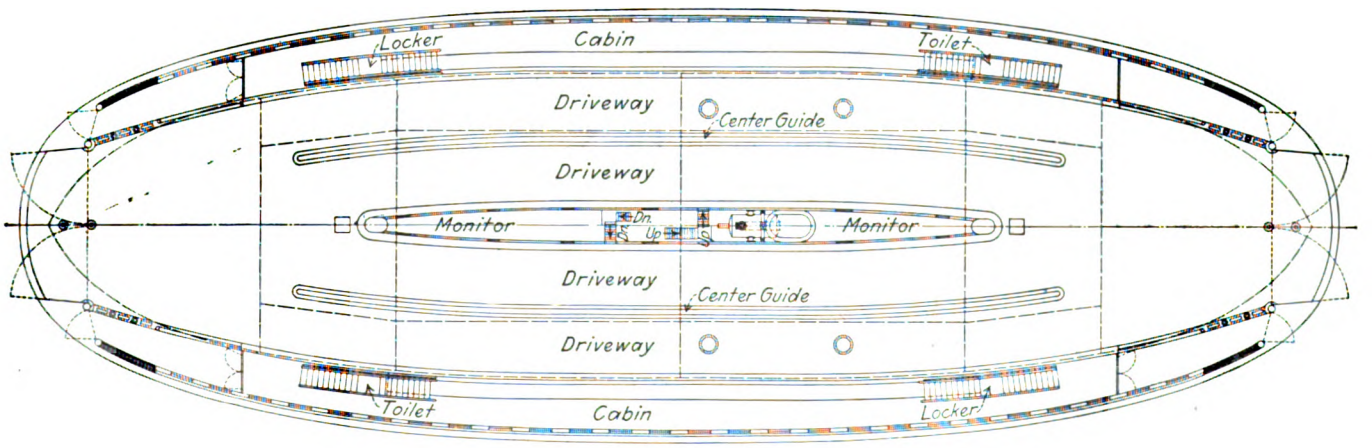


OUTBOARD PROFILE



UPPER DECK



MAIN DECK

Outboard Profile and Deck Plans

passenger accommodations is arranged so that it may be used to accommodate the overflow when conditions of heavy traffic so require. In this connection an ingenious installation of hinged stairways is provided to afford access to the upper deck. In ordinary circumstances these stairways are hinged up and supported under the deck overhead, but may be readily lowered when desired. The construction and equipment of the vessels meet all requirements of the United States Steamboat Inspection Service.

The principal dimensions of the ferryboats are as follows:

Length over all	174 feet
Length outside to outside of propeller posts	146 feet 6 inches
Beam, extreme over guards	57 feet
Beam, hull, molded	40 feet
Depth, molded	15 feet 4 inches
Draft with water and fuel	9 feet

There are two longitudinal trusses, one on each side of the vessel which serve to distribute the load and add to the longitudinal strength. They are built up with 4½-inch by 3-inch ties, set vertical and 3½-inch by 3-inch crosswise angles connected by gusset plates to continuous tie plates.

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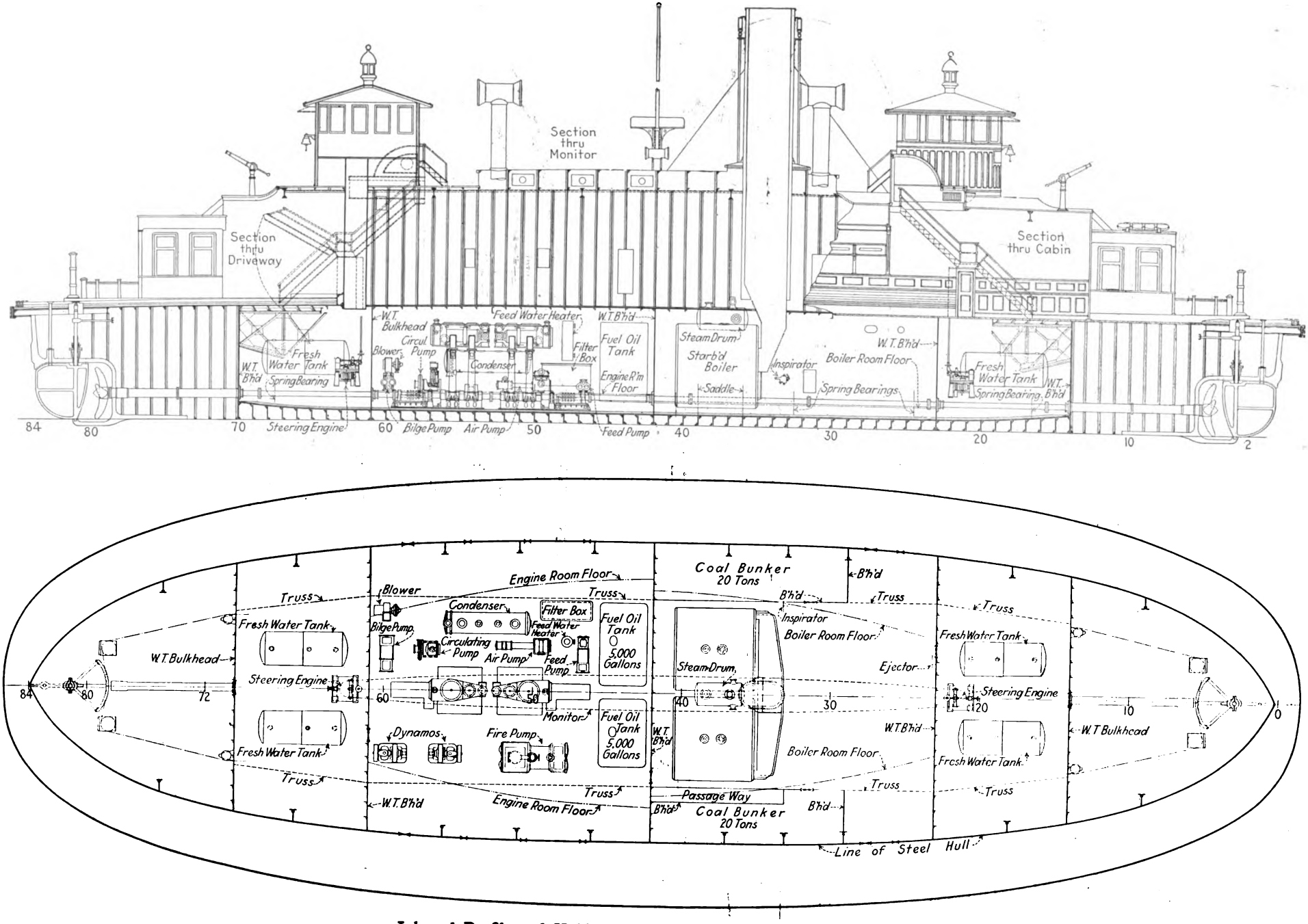

Inboard Profile and Hold Plan, Showing Machinery Arrangement

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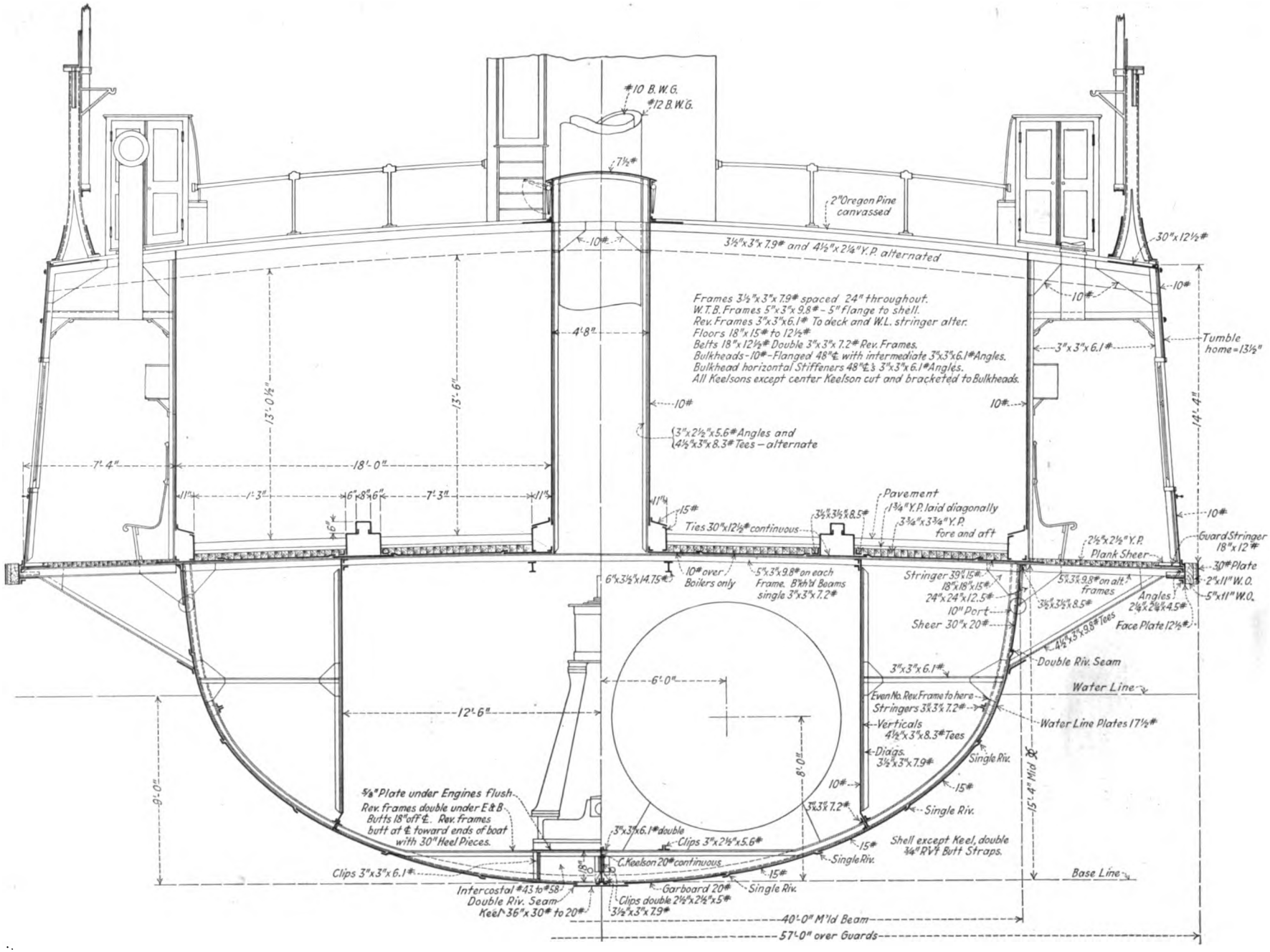

Midship Section

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The framing is transverse, spaced 24 inches center to center.

The driveways are decked with yellow pine, laid over 10-pound plating in way of the machinery space. On top of this a pavement of the patent Shuman type is laid, which is made up in slabs using oak, rock elm, maple or other hard woods. These slabs run the full width of the driveways and are about 6 feet long. They are made up of continuous stringers with the grain running athwartship, alternating with blocks arranged with the grain running vertical. The blocks and stringers are cemented together with hot liquid asphalt and in addition are bolted together with through bolts ⅜-inch in diameter, there being three bolts to each section. These slabs are spiked to the deck and afterwards painted with a heavy coat of liquid asphalt applied hot and a layer of stone dust ½-inch thick spread over the surface.

MACHINERY

The propelling machinery consists of two vertical inverted, compound type engines, each having a 15-inch diameter high pressure cylinder, a 30-inch diameter low pressure cylinder and a common stroke of 22 inches. The crank shafts of the engines are coupled together by flanges on the high pressure ends and compose the center section of a shaft running the length of the boat and driving the two propellers, one at each end of the vessel. The engines are controlled by a common throttle valve and maneuvering has been provided for by flanging the ends of the link crank shafts together, a single reversing engine taking care of both engines. The two propellers, always working in unison, one as a tractor and the other as a propeller, according to the direction of rotation, are of cast steel, with an outside diameter of 7 feet 6 inches and a pitch of 10 feet 6 inches.

The engines for the vessels were built by the Vulcan Iron Works, Jersey City, N. J., under contract from the Kearfott Engineering Company, Inc. The shafting, propellers and condensers are the product of the Ferguson-Herbert Corporation, an affiliation of the Kearfott interests.

BOILERS

Steam is generated in two single ended Scotch boilers 11 feet in diameter and 11 feet long, designed for a working pressure of 150 pounds of steam and built by the Great Lakes Boiler Works, Buffalo, N. Y. Each boiler is provided with two furnaces fitted for coal or oil burning.

AUXILIARY MACHINERY

The auxiliary machinery includes:

One cylindrical condenser with approximately 1,100 square feet of cooling surface.
One 10-inch by 14-inch by 16-inch horizontal simplex air pump.
One centrifugal circulating pump driven by an independent engine.
One 7-inch by 4½-inch by 10-inch feed pump.
One feed water heater with a heating surface of 45 square feet.
One filter tank.
One inspirator of the double tube type.
Two ejectors for discharging bilge water.
One 10-inch by 5-inch by 12-inch bilge pump of the horizontal duplex type.
One 20-inch by 12-inch by 16-inch horizontal duplex fire pump.
One hand bilge pump.
One ventilation blower.

The lighting of the vessel is accomplished by two 10 kilowatt generating sets, located in the engine room, and a small storage battery, provided to supply current for emergency lights.

For steering the vessel there are provided two steam steering engines with cylinders 4½ inches in diameter and 4½-inch stroke. This gear is of the "Hastie" type having twin cylinders mounted above the winding drum. The design has many unique and commendable features, chief of which is the accessibility of the engine.

DESIGN DATA

The following enumerates some of the general design data taken from these vessels:

Weights

Hull, steel	305 tons
Hull, wet, paint and cement	135 tons
Fittings, outfit, equipment and stores	37 tons
Machinery	120 tons
Fresh water	18 tons
Fuel oil	33 tons
Margin	30 tons
Total weight of ship without cargo	678 tons

From figures prepared from the lines without allowance for shell plating, rudders, or other appendages, a displacement of 678 tons occurs at a draft of hull of 9 feet. To this should be added, however, one foot additional draft for the skedge.

Table I.—Trim Under Various Fueling Conditions

Condition	Displ.	Draft	Trim lever	Mom. to alter trim 1"	Trim
Ship complete, no fuel	645	8′9″	.12′s	82	.95″s
Ship with 33 tons fuel oil	678	9′0″	.30′s	86	2.4″s
Ship with 33 tons coal	678	9′0″	.51′h	86	4″h
Ship with 40 tons coal	685	9′1″	.64′h	87	5″h

Table II.—Trim Under Various Load Conditions

Condition	Displ.	Mean Draft	Trimming Moment	Mom. to Trim 1"	Trim	Change of draft at one end
(1) Ship complete with complement, 18 tons water and 33 tons of oil	678	9′0″	203 S	86	2.4″s	1.2″
(2) As in (1) but with 175 tons of cargo	853	10′4½″	203 S	105	1.9″s	1″
(3) As in (1) but with an 18-ton truck on after end	696	9′2″	1588 S	88	18″s	9″
(4) As in (2) but load (175 tons) located at 29 ft. aft of midships	853	10′4½″	5273 S	105	50″s	25″

Firefoam Hand Fire Extinguisher Approved by Steamboat Inspection Service

THE United States Steamboat Inspection Service has recently approved the U. S. Type No. 2½ Firefoam hand extinguisher manufactured by the Firefoam Company of New York for use on all vessels coming under its jurisdiction. This extinguisher is splash proof which prevents premature mixture of the solutions which might otherwise occur with the rolling of a ship. It is operated by simply inverting and the pressure generated will throw a stream of Firefoam from 30 to 40 feet. About 20 gallons of Firefoam, forming a blanket of carbon dioxide bubbles, are discharged from the extinguisher. The equipment weighs 40 pounds and can be handled by one man. Because of its property of floating on the surface of oil and other inflammable liquids it is claimed that Firefoam is particularly useful for the protection of boiler rooms, engine rooms, fuel oil pumps rooms and other hazardous points.

Hand Fire Extinguisher

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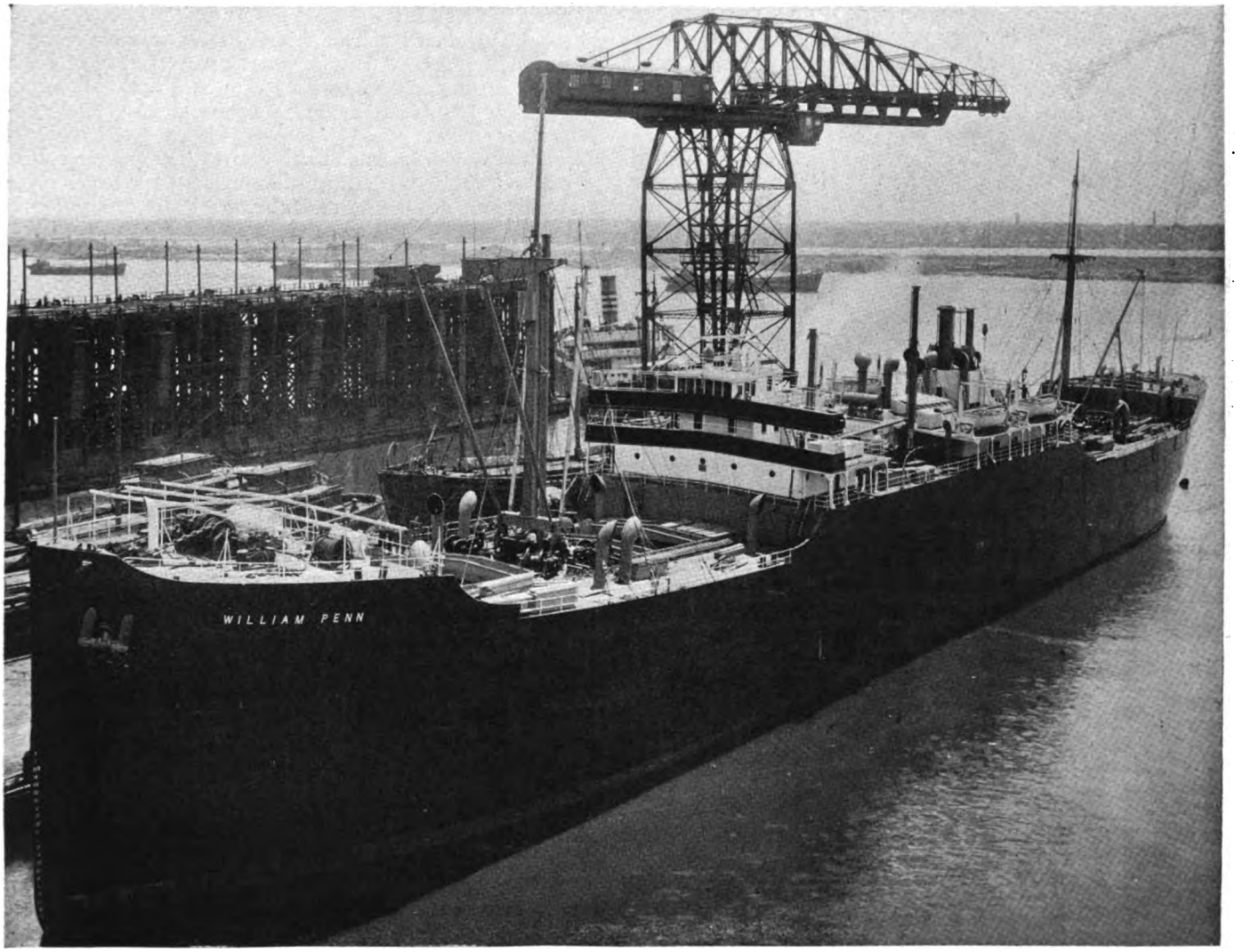

William Penn, the Shipping Board's First Motorship

Winch Motors of the Motorship William Penn

Shipping Board's First Motorship Equipped with Electrically Driven Auxiliaries—Winch Motors Rated at 30 Horsepower

By G. A. Pierce*

ONE of the recent developments in marine engineering is the tendency to use electric motors in place of steam engines for driving ship's winches, windlasses, capstans, steering gear, pumps, blowers and other auxiliary machinery. This tendency implies the general recognition of two facts: In the first place, that reliable marine motors are now available; and, secondly, that motors are more satisfactory than steam engines for auxiliary service.

The reliability of motors on shipboard has been amply proved by their records on both naval vessels and motorships. Motor manufacturers have had difficulty in building practical electrical equipment for ships but increasing experience and a better knowledge of marine conditions are providing the remedy for such troubles and it can be proved conclusively that the cases of motor failure have been due to installing apparatus which was not at all suitable for shipboard use.

*Electrical Engineer, William Cramp and Sons Ship and Engine Building Company, Philadelphia, Pa.

As regards the desirability of motors from an operating standpoint, such tests as are available indicate that an electric deck auxiliary system requires only from one-third to one-quarter the amount of fuel needed by a corresponding steam system, so that substantial economies can be obtained through the use of motors. In addition, electric wires are far more convenient, economical and satisfactory than steam pipes for distributing power throughout a ship.

The designing of marine auxiliary motors is, however, still in its early stages and no generally accepted standards have as yet been developed. Consequently it is believed that a description of the construction, control and performance of the winch motors of the United States Shipping Board motorship *William Penn*, which are of an entirely new design, will be of interest at this time.

The Motorship William Penn

The *William Penn* is the Shipping Board's first motorship. She is a cargo vessel of 12,358 tons deadweight capacity and

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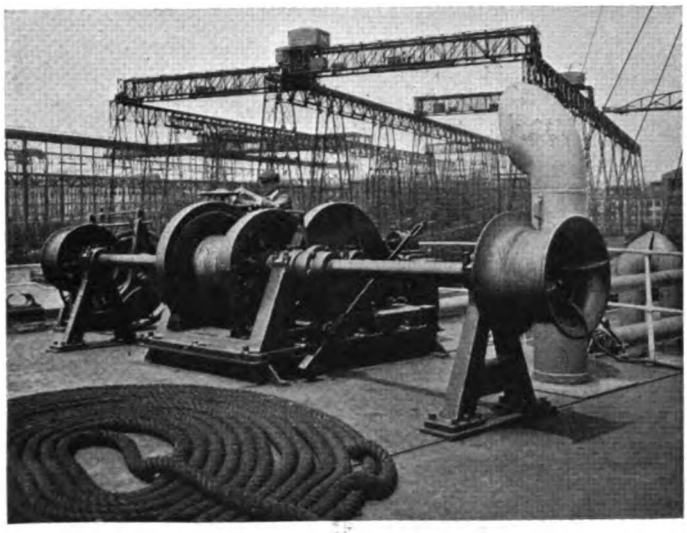


Warping Winch

is propelled by two 2,250 indicated horsepower Burmeister and Wain Diesel engines direct-connected to her propellers. Her hull was built at the Gloucester yards of the Pusey and Jones Corporation and she was fitted out by William Cramp and Sons Ship and Engine Building Company. She is allocated to the Barber Lines, where she is being used in the Far Eastern trade.

Practically all of her auxiliaries are motor-driven, the power being supplied by three 65-kilowatt Diesel engine driven generators, supplying 220-volt direct current. Most of the below-deck motors are of foreign make; but those for the deck winches, anchor windlass and steering gear were supplied by the Westinghouse Electric and Manufacturing Company, in consultation with the William Cramp and Sons Ship and Engine Building Company.

There are eleven deck winches altogether on the *William Penn,* ten being used for cargo handling, with one in the stern for warping. They were built by the American Engineering Company of Philadelphia, in accordance with the Cramp Company's particular requirements. They are of the compound gear type with gear ratios of 12.5 to 1 and of 26.45 to 1, from motor to drum, with the hoisting drum 18 inches in diameter. Each winch has three gypsy heads, two of which are on the first reduction, or counter shaft, and are used for handling light loads and whips. The winches are designed to lift 5,000 pounds on the first gear ratio and 10,000 pounds on the second. A ¾-inch steel hoisting line is used on the drums.

The Winch Motors

In designing the winch motors it was recognized that they must be very different from similar machines for land service and special attention was given to their mechanical strength, waterproofing, ability to withstand high temperatures and their speed characteristics.

Great strength is necessary to withstand the rough handling these motors are bound to receive, so they have been built with cast steel frames and extra large shafts and bearings. The commutators and brushes have also been made especially large in order to eliminate frequent renewals of these wearing parts. The armatures are of specially small diameter to reduce the flywheel (WR^2) effect. This results in an appreciable saving in power when all of the winches are in operation and permits a reduction in the generator capacity.

The frame, which totally encloses all of the working parts of the motor, is split horizontally to permit access to the interior. The joint between the two parts is made waterproof and, for the same purpose, the handhole covers are provided with gaskets. The wires enter through a special watertight junction box and the shafts are made watertight by S. E. A. rings. All small parts usually made of steel, such as springs and bolts, are made of non-corrodible metal. Thus, these motors are capable of withstanding total submergence.

But the arrangements that insure waterproofing also prevent ventilation and, since these motors are liable to be operated when exposed to the full force of the tropical sun, special precautions had to be taken to prevent injury due to high temperatures. Internal heating was, therefore, reduced to a minimum by making all current-carrying parts of liberal proportions, thus cutting down the losses due to resistance, while practically all of the coils are provided with water-and-oil-proof mica or asbestos insulation.

The field windings have been so designed that high speeds are obtained with the empty hook and light loads, and low speeds with heavy loads.

The nominal rating of each of these motors is 30 horsepower at 220 volts.

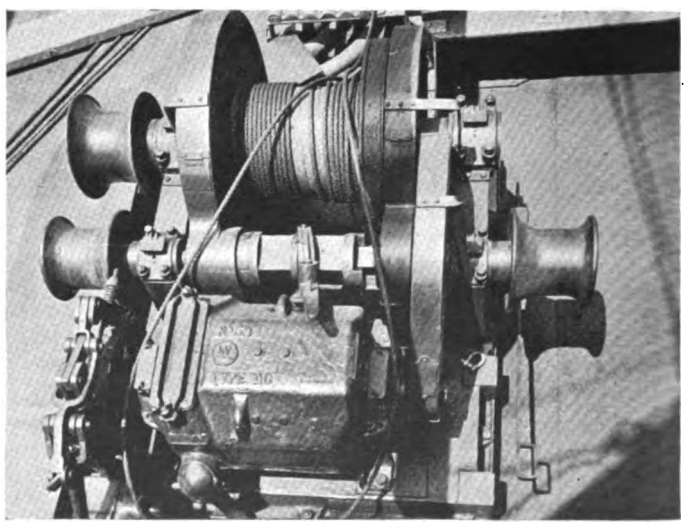
Brakes

Each winch motor is provided with a brake, which is released when the current is turned on and is promptly applied and holds the load when the current is turned off. The brake parts are of non-corrodible metal; the bearing pins of the shoe mechanism are of bronze with brass bushings to prevent sticking. The operating coil is imbedded in a waterproof cement and is enclosed in a watertight housing. Means are provided to release the brake when the current is off in case of necessity.

Controllers

The controllers are operated by vertical brass handles, which can be arranged so that one man can operate either one or two winches, as desired. The mechanism is enclosed in a cast iron case, with doors in three sides, giving ready access to the interior. These doors are watertight even when totally submerged. The operating parts are interchangeable as far as possible and can be readily renewed. A small knife switch disconnects the controller from the line so as to permit inspection and repairs without interfering with the operation of the other winches.

The necessary resistors are of non-corroding cast iron and are enclosed in waterproof cases. Ventilation is provided by openings with covers which are raised and lowered by means of a hand wheel. These covers are electrically interlocked with the controllers, so that no motor can be started unless the covers of its resistor are open.



Motor Driven Winch, Showing Method of Mounting the Motor

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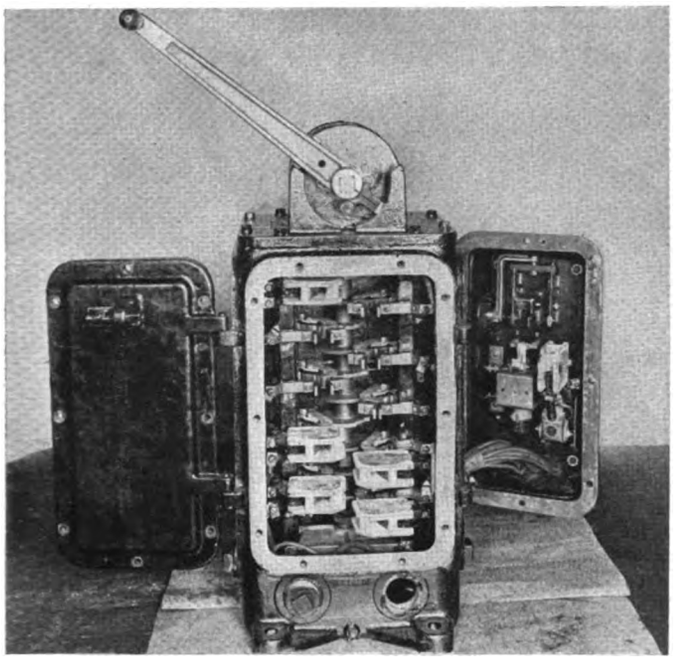


Winch Controller, with Doors Open

Moving the controller handle in either direction from the vertical position releases the brake, starts the motor in the corresponding direction of rotation and brings it up to full speed in several steps. Moving the handle back towards the vertical position reduces the motor speed; if the load on the hook is sufficiently heavy to lower by its own weight dynamic braking is automatically applied.

OPERATION

In this process the winch motor is transformed into a generator operated by the weight of the load. Since, under these conditions, the speed of a generator depends upon the current being generated, the speed of the winch motor and therefore of the descending load can be regulated with great nicety by means of the controller. The use of this method greatly increases the speed and safety of handling the cargo; and it also effects some economy as well, since some of the current generated returns to the line and helps to operate the other winches.

When the controller handle is moved to the off position the full force of dynamic braking is applied, thus checking the speed of the load smoothly and almost instantly. The mechanical brake is then automatically applied.

In case of an overload on the motor or the failure of the line voltage, the motor is automatically disconnected from the line by a circuit breaker and the mechanical brake is applied. By bringing the handle of the controller back to the off position the motor is re-connected but if the cause of the trouble has not been removed the circuit breaker immediately opens again.

OTHER MOTORS

The anchor windlass motor is similar in design to the winch motors, but is considerably larger, having a capacity of 68 horsepower. Its controller is mounted below decks and is operated by a hand wheel above the deck.

The steering gear motor, which operates the hydraulic pump of the steering gear continuously, has non-corrodible parts, impregnated windings and bearings that will operate at an angle.

PERFORMANCE AND TESTS

Tests on the winch motors gave the following results:

Rope speed, no-load, hoist.....457 feet per minute
Rope speed, no-load, lower.....337 feet per minute
Rope speed, 5000-pound load, hoist.....170 feet per minute
Rope speed, 5000-pound load, lower.....470 feet per minute
(The above figures are for operation on high gear)

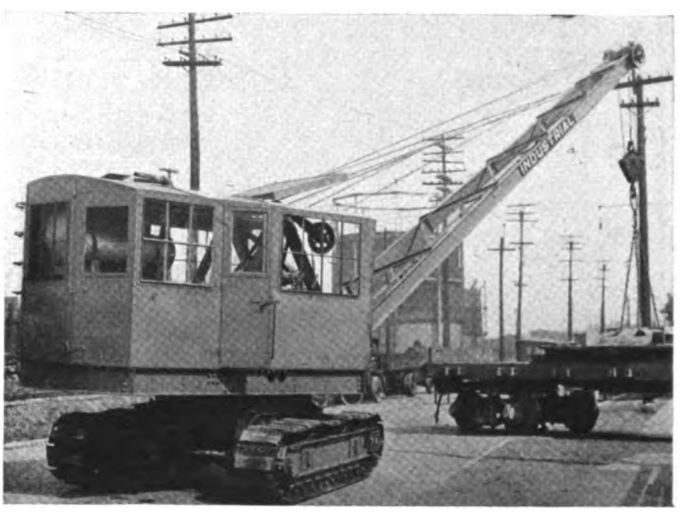
The maximum continuous cargo handling capacity of each winch motor was found to be 45 tons an hour. That is to say, the motors could handle cargo at this rate indefinitely without injury if the loads could be supplied to them. When operating with two winches lifting 4,000-pound loads 80 tons per hour can be handled by each pair of winches and the ship could be loaded at this rate in 30 hours of continuous operation. However, it was found that the speed of loading was dependent upon the dock facilities, as the winches were able to handle cargo more rapidly than it could be supplied to them.

The fuel consumption of the auxiliary Diesel engines, when supplying current for electric lighting, all auxiliaries and all ten winch motors, was 90 gallons of oil per 24-hour day, the winches being in use for 8 hours.

Industrial Crawling Tractor Crane

TWO new types of "Industrial" crawling tractor cranes developed to meet the need for full revolving tractors which can be operated independently of rails are being built by the Industrial Works, Bay City, Mich. One type having a capacity of 20,000 pounds at a boom radius of 12 feet is equipped with continuous crawling tractor belts while the second crane with a capacity of 18,000 pounds at a 10-foot radius is equipped with four broad-gage tractor wheels. Either crane is arranged to handle a hook and block, a grab bucket, an electric lifting magnet, a shovel dipper or a drop hammer in conjunction with pile driver leads, whichever is required by the service in which the crane is to be used.

A special feature of the equipment is the internal combustion engine which supplies power both for hoisting and propelling purposes. The crane is equipped with a 30-foot boom made up of two channels and latticed angles and tie plates. By means of friction clutches and brakes controlling the motion of each tractor belt or of each set of tractor wheels the operator is able accurately to control the steering of the crane while it is in motion. This is accomplished by disconnecting one tractor belt from the motor while the other belt continues traveling at the normal rate of speed. The disconnected tractor belt can be held stationary by applying the brake or can be allowed to coast with the brake and clutch both disengaged, or, if the clutch is allowed to slip, the operator can cause the crane to turn as sharp, or as wide, a corner as he may desire. The entire mechanism both for hoisting and for propelling is contained in the revolving cab on the upper works.



"Industrial" Crane With Crawling Tractor Belts

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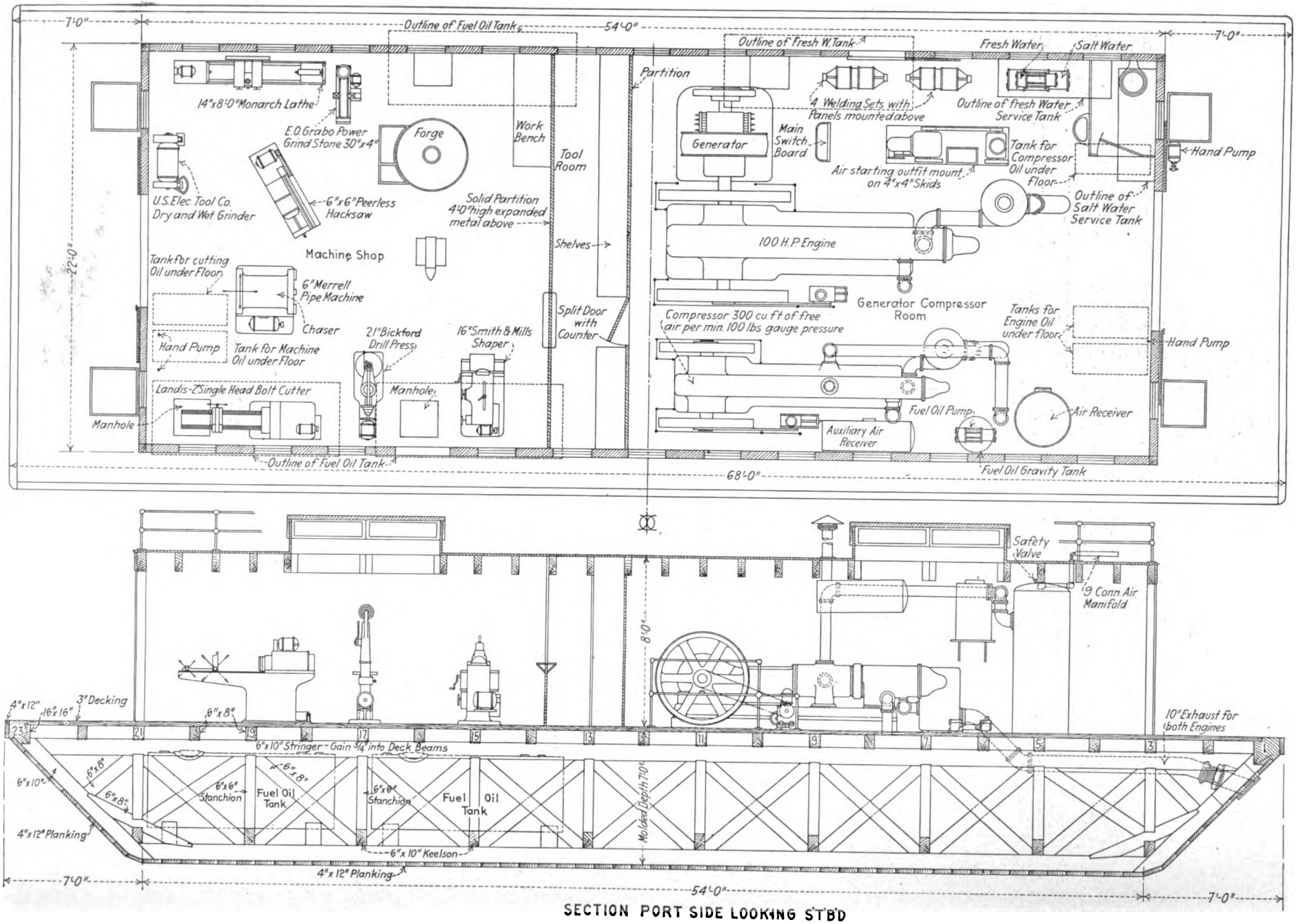

SECTION PORT SIDE LOOKING STBD

General Arrangement of Machinery in the Federal Repair Barge

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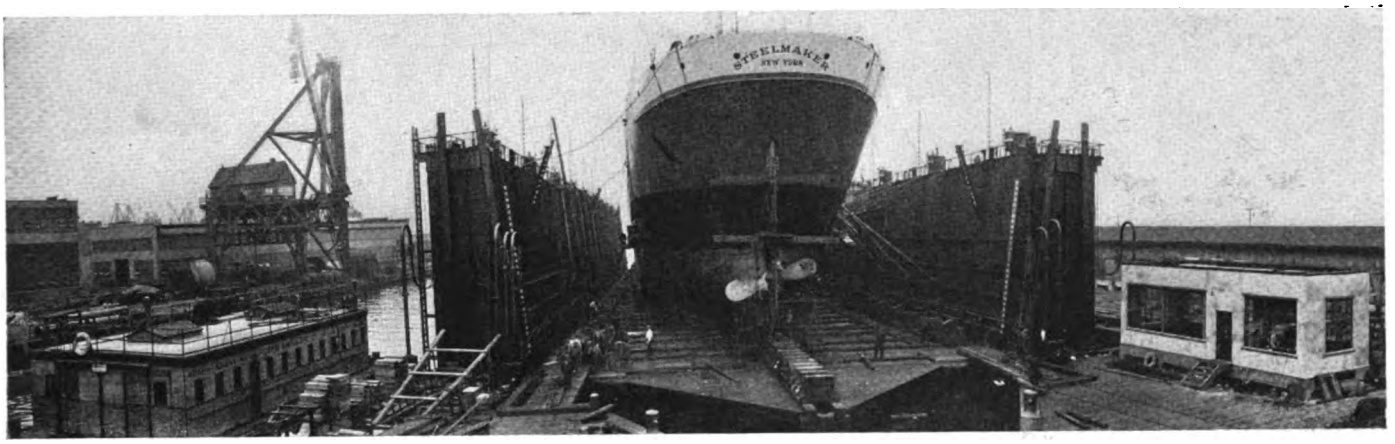


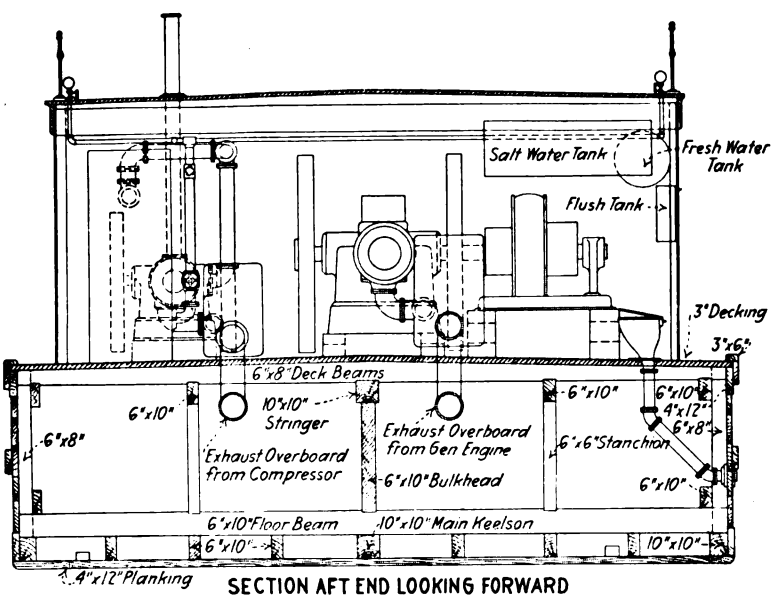
Nine Thousand Ton Dry Dock and Welding Repair Barge in the Wet Dock of the Federal Yard

Federal Shipyard Takes Up Ship Repairing

Nine Thousand Ton Floating Dry Dock and Combined Welding Barge and Machine Shop Added to Yard Equipment

FOR the combined purpose of maintaining the ships of the subsidiary operating companies of the United States Steel Corporation, and also to engage in a general ship repair business, the Federal Shipbuilding Company, Kearny, N. J., has within the past few months built up a complete repair organization and recently increased the facilities of the yard by the addition of a 9,000-ton floating dry dock and a floating welding barge and machine shop.

The Federal yard, which was completed in 1918, is one of the largest shipbuilding plants on the Atlantic coast, having building ways for twelve 15,000-ton vessels. The yard occupies a site comprising 170 acres with a water frontage on the Hackensack river of 2,400 feet. The layout of shops and ways in relation to each other, the material handling equipment and shop equipment have been designed with the one idea of promoting productive efficiency. At the down-river end of the shipways is a wet basin for fitting out and in which the new dry dock is located. Serving the wet dock is a 100-ton, 3-leg jib crane which is of great importance both in fitting out new ships and in repair work for handling boilers, propellers and other heavy materials.



Section Through the Compressor and Generating Room of the Repair Barge

Details of Dry Dock

The new dry dock, which is of the rigid, steel wing-wall type, built according to the William T. Donnelly patent rights, was put into commission June 23 when the steamship *Suhulco* of the Transmarine Corporation was docked for repairs. The overall length of the dock on the keel blocks is 440 feet and its overall width 110 feet. Vessels having a draft of 22 feet can be docked and ships up to 9,000 tons deadweight and 475 feet in length can be raised. Nine wooden pontoons built of Oregon fir each 110 feet long, 41 feet wide and 13 feet deep were used in the construction of the dock. The steel wing-walls which run continuously across the pontoons are used to equalize any irregularity of pumping or pontoon buoyancy and to absorb stresses which in the case of certain other types of floating dry docks are liable to be transmitted to the ship. The steel wing-walls used on this dock are the longest continuous walls of any in the New York district.

The pumping equipment consists of eighteen 12-inch centrifugal pumps operated by individual 30-horsepower General Electric motors. A pump is located at the outer end of each pontoon directly under the wing-walls and its shaft is extended to the motor located on the wing-wall deck Motors can be controlled individually or in groups from the controller house located on the wharf and one man in the controller house is able to regulate the entire pumping equipment of the dock. The sinking of the dock is governed by gate valves at the end of each pontoon; the wheels of these valves are located on the top of the wing-walls near the motors. Water is admitted through these gates for submerging the dock and the same gates are used for discharging while the dock is being raised. A ship can be raised in the dock at the rate of nearly a foot a minute.

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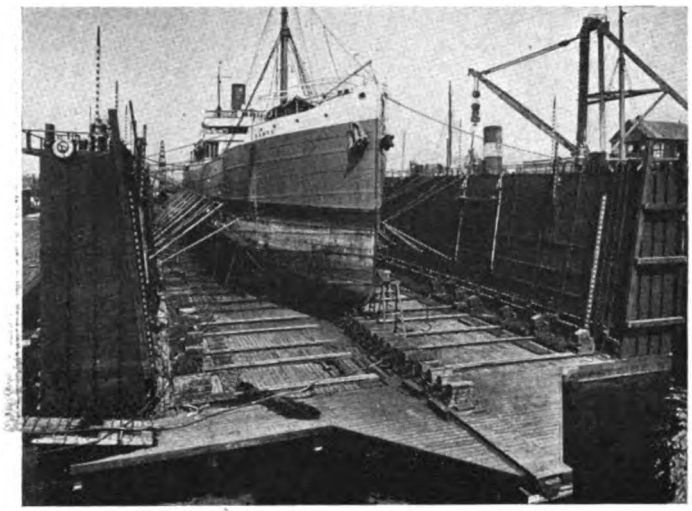
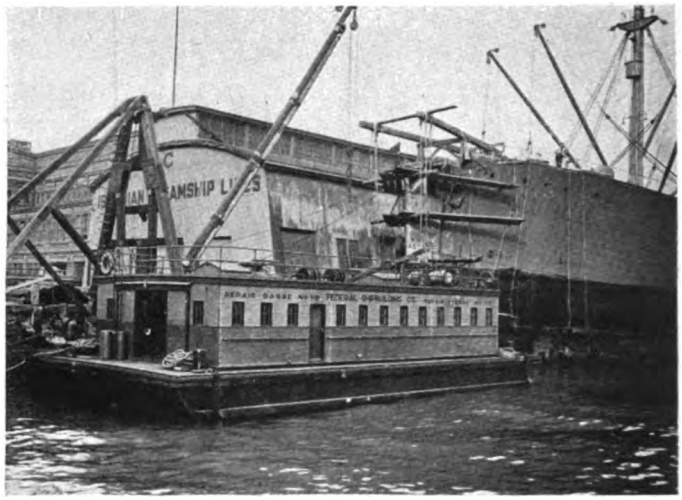


Steamship Bantu Being Reconditioned in Dry Dock



Repair Barge at Work on the Bow of a Steamship

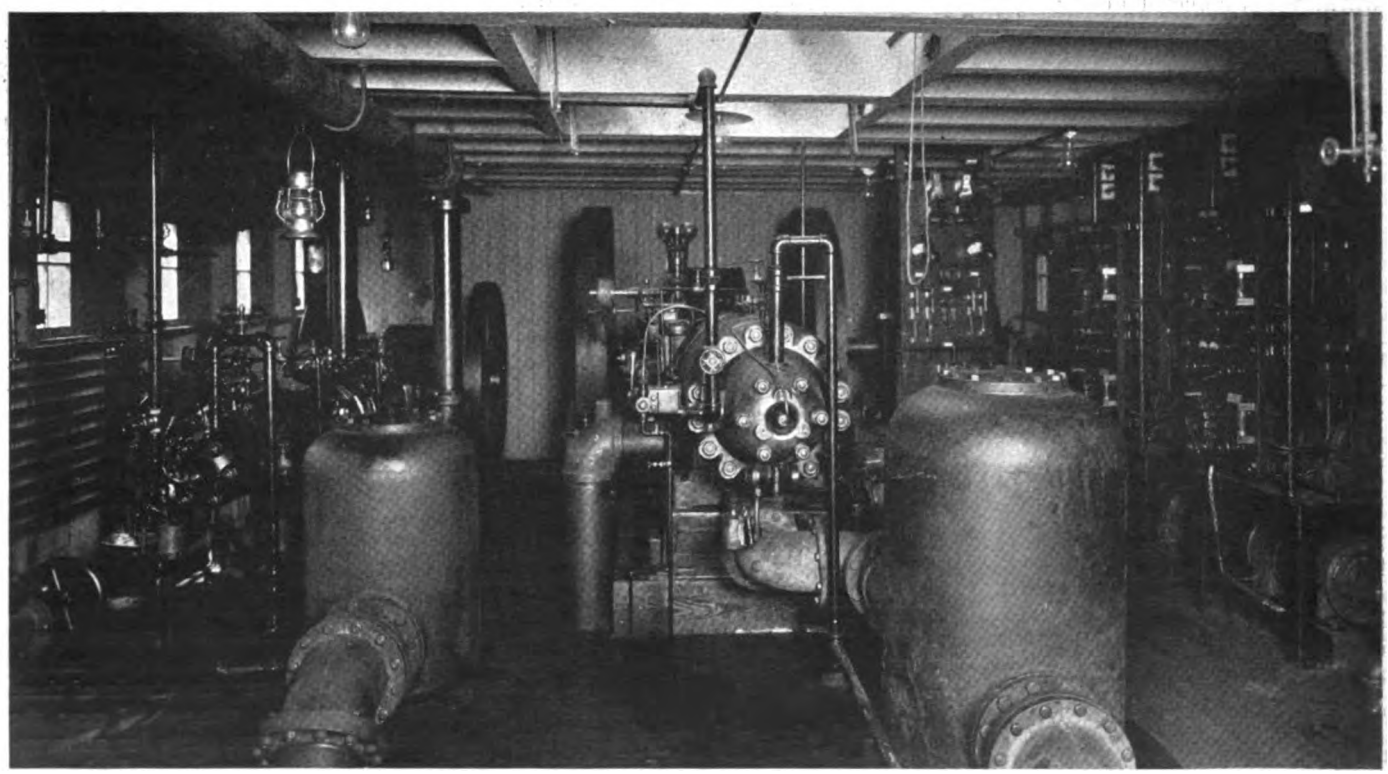
Air and fresh water lines run the length of the dock and it is adequately supplied with facilities for temporary lighting from the power lines of the yard. A feature of this dock is the system of permanent scaffolding provided, which consists of hinged galvanized pipe booms from which painters' platforms are hung by blocks and falls. These booms are lowered against the side of a ship when it is docked and provide quick access for work on all parts of a ship's side plating. A feature of this scaffold system is the possibility of using short handle brushes in painting a vessel, which eliminates the use of long handles and permits the men more efficiently to cover a surface. In cleaning and scraping the plating these scaffolds are useful in allowing the men to get close to the work. When not in use the booms and the scaffolds are hauled back against the wing-walls where they are clear of all other rigging.

Access to the dock is by means of two gangpanks at the west end and one gangplank at the east end. A stairway connects the top of the south wing-wall to the wharf and a light bridge set in place by a locomotive crane connects the ship's deck to the wing-wall. By means of this stairway and bridge material can be carried to and from the ship without the use of ladders. Ships on which stern repairs are to be made are docked stern first and propellers, heavy staging and the like are handled by a 35-ton locomotive crane operating from the wharf.

Construction Record for Dry Dock

Actual construction on the dock started January, 1921, when the framing of the first pontoon was begun, the last pontoon being launched in May. The dock was ready for operation by June 18, the first boat being docked as noted on June 25. Since beginning operation the dock has been constantly in service.

In order to carry on minor repairs the Federal Company recently put into commission a floating power plant and



Interior of the Compressor Room of the Barge, Showing the "Little Giant," 100 Horsepower Semi-Diesel Engine, the Compressing Unit, the Main Switchboard and Welding Equipment

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machine shop for handling work both at the yard and on vessels taking on or discharging a cargo at any point in New York harbor. A special feature of the new barge is the power generating and air compressing machinery, consisting of a 100 horsepower semi-Diesel horizontal oil engine driving an 80-kilowatt direct current generator and a similar type semi-Diesel engine direct connected to a 300 cubic foot horizontal air compressor. The barge is of wooden construction and has the following dimensions:

Length over all	68 feet
Beam	26 feet
Length on bottom	54 feet
Rake at ends	7 feet
Depth molded	7 feet
Load draft	2 feet 9 inches
Camber of deck	2½ inches

The deckhouse has a length of 54 feet and a width over the planking of 22 feet. The clear height at the centerline is 8 feet and two 8-foot by 5-foot skylights are provided. Two transverse partitions amidships form a tool room, on one side of which is located the generator and compressor room and on the other the machine shop. Between the frames and the bracing in the hold of the barge are located three 1,000 gallon capacity fuel oil tanks, one 1,000 gallon capacity fresh water tank, one 60-gallon capacity lubricating oil tank for compressors, two 60-gallon capacity engine lubricating oil tanks, one 60-gallon capacity machine lubricating oil tank and one 60-gallon capacity cutting oil tank.

GENERATOR AND COMPRESSING MACHINERY

The power plant as noted consists of one 100-horsepower, single cylinder semi-Diesel engine driving an 80-kilowatt, 125-volt direct current generator; a semi-Diesel oil engine direct connected to a horizontal air compressor for operating air tools and one small gas engine driven compressor used for supplying starting air to the engines. Power for operating four, 3-kilowatt motor generator welding sets, machine tools and lights is furnished through a main switchboard by the generator.

The semi-Diesel oil engine, supplied by the Chicago Pneumatic Tool Company, is of the horizontal straight line crosshead type mounted on a sub-base designed to reduce the vibration which in a barge of this size would be excessive without special provisions as in this case. This type engine is valveless utilizing the two-stroke cycle with low compression. All parts in the crank case are readily accessible for maintenance and repair. Ignition is secured by the injection of fuel into a hot liner in the combustion chamber.

The air compressor unit, also manufactured by the Chicago Pneumatic Tool Company, has a capacity of 300 cubic feet per minute at 100 pounds gage discharge pressure. Briefly, this machine is of the horizontal direct connected type with the power cylinder and air cylinder in tandem on a common piston rod separated by a tandem piece which affords access to the stuffing boxes for both cylinders. The power cylinder is similar in action to the oil engine described above while the air cylinder is of the double acting type fitted with flat disk inlet and discharge valves.

The fuel oil is pumped from the storage tanks into gravity tanks located over the engines by a 3-inch by 2¾-inch by 4-inch horizontal duplex piston pump. The fresh water service is handled by a 3-inch by 2¾-inch by 4-inch horizontal duplex pump which also supplies the lavatory and fresh injection water to the oil engine cylinders. A 5½-inch by 3½-inch by 5-inch horizontal duplex pump serves the purpose of a bilge, fire and general service pump. This pump has suctions from the bilges and from the sea. It discharges overboard and to the fire and sanitary systems. All pumps are air driven. A complete hot water heating plant, consisting of pipe radiators and a small boiler of the American Radiator Company type, is installed.

The electric welding outfit consists of four 3-kilowatt General Electric one-man welding machines. The generators for these units are direct current compound wound machines operating at 125/160 volts and 150 amperes. Motors for these sets run at 1,700 revolutions per minute. Each set is supplied with a welding control panel and with sufficient wiring to permit operation of the electrodes in any part of the ship on which repairs are being carried out. Current control for lighting and power distribution from the generator is maintained through a main switchboard installed near the power unit. Oxy-acetylene welding and cutting torches and gas tanks are carried as part of the equipment for use when work by this process is found necessary. A full equipment of electric and air hand tools is provided.

EQUIPMENT OF MACHINE SHOP

The machine shop section of the barge is completely fitted out for practically all light engine repair operations. The equipment in the shop includes a 14-inch by 8-inch Monarch geared engine lathe, a United States Electric Tool Company wet and dry grinder, a 6-inch by 6-inch Peerless hack saw, a 6-inch Merrell pipe machine, 2-inch Landis single head bolt cutter, a 21-inch Bickford drill press, a 16-inch Smith & Mills geared crank shaper, a 30-inch by 4-inch wet grinder, a 12-inch double emery grinder, a 45-inch forge with canopy hood and motor driven blower.

CURRENT WORK OF THE REPAIR UNIT

During the month of September dry dock and repair work has been done on the *Bantu, Steel Inventor, Steel Ranger, Steel Age,* and *Robin Goodfellow.* One of these ships, the *Steel Age,* is now being completed and work is in progress on the *Grand Republic.* Within a short time reconditioning of the *Charlton Hall, Bessemer City* and *Steel Voyager* will be commenced.

Portable Belt Conveyor Used at Tampa for Coaling Ships

BY using a portable belt conveyor the Tampa Coaling Company, Tampa, Fla., has achieved mechanical coaling of ships at low first cost of machinery, low upkeep cost and considerable capacity. With the conveyor shown in the illustration, which is manufactured by the Barber-Greene

Coaling Ship with Portable Belt Conveyor

Company, Aurora, Ill., vessels are coaled at the rate of 400 tons a day. Usually the coal is taken from the storage pile shown on the dock but if railroad cars of coal arrive at the dock at the same time the ships are to be coaled, the process is simplified. A second conveyor takes the coal from the car, discharges it directly onto the inclined conveyor and the coal is put aboard the vessel at a minimum expense in time and labor.

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The Most Interesting Job in the Yard

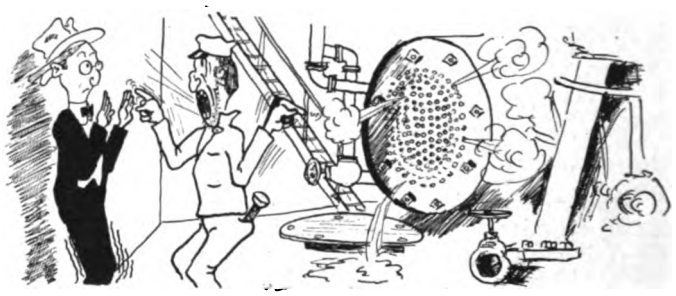
Under the above title a letter was published in our last issue telling why a machinist in the engineering department of a large ship repair yard considered his job the most interesting one in the yard. This was a challenge we invited our readers to accept and this month a member of the "white collar crew" in the engineer's office vividly explains why his job has a claim to this title. What do YOU *think about it? If your job is entitled to consideration in this controversy (and it probably is), here is a chance to explain its interesting features which other men in the yard probably know little or nothing about. Who's next?*

I HAVE read various articles written under the above heading, but I have never read one dealing with the Engineering Department, that miscalled "white collar crew," of which I have the honor to be a member, although I must confess that the only time I wear a white collar is to and from my work.

Granted that the shop work is interesting, also grant that all of the other branches in the yard are interesting to those engaged in them, but how about this "white collar pencil pushin' guy?"

Suppose some cold, rainy, windy day when all the elements seem to have set out to do their darnedest, a ship comes limping into port with bottom trouble. Word goes to the "Old Man" and he in turn sends for one of the engineers. The following conversation takes place:

Tug, Launch or Raft



Condenser Trouble

"Brown," says the "Old Man," as the door opens, "There's a ship down the river by the name of *Blank*. We want to dock her. Haven't any docking plans. Go down and look her over and get back here as soon as possible. Want to take her on the next tide."

Brown says, "Yes, sir," and beats it. It is now his job to get aboard the ship *Blank* on a tug, launch or raft, it is all the same to the "Old Man." So he puts on his oil-skins and lights his pipe, if he be of the tobacco burning kind, and sallies forth. After many trials and tribulations he finds himself aboard the good ship *Blank*, where his troubles ought to be at an end. But not so, the crew of this good ship speaks no English, so Brown has to go about his work the best he can.

However, in due time Brown returns to the yard where he turns his stuff over to the "Old Man" and gets the third degree until he, who thought he had every measurement just right, begins to think that he is all wrong. But he sticks to his story and the dope is passed out to the yard where the dock is laid out to his specifications.

Finally the vessel arrives and goes into dock and proves that Brown's measurements are about right after all. Brown himself in the meantime has been like a turkey on a hot griddle until he had seen the dock pumped dry and the ship safe on her blocks.

That is one phase of an engineer's job. Now let us take another.

Suppose a vessel has condenser trouble. Brown goes on the job. The ship's engineer doesn't know how many tubes are leaking or anything else about it, except that it is out of whack and he wants it fixed. The vessel has just arrived in port and has all kind of trouble getting in, the crew hasn't had time to open anything up. Nevertheless the owners want a price for fixing things up in a first-class condition and it is up to Brown to collect enough data to make that price.

As They Are

As the Yard Thinks

In this instance Brown has to be a cross between a prophet and a Houdini. After listening to the chief engineer express

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his opinion of the proposed cut in the engineer's pay and of the fellow who sold him the last lot of fuel and various other subjects he finally runs into the mate.

The mate is apt to tell him about the kind of food his wife has been feeding the baby in his absence and ask Brown's opinion of it. Brown, being a good fellow, talks long and learnedly on the various baby foods, although the subject is rather far fetched from leaky condensers.

Along about this time the captain comes along and, being away from the port for a long time, wants to know all the latest news and winds up by giving Brown a couple of wicked looking cigars, which upon trial cannot be smoked.

Now as this has taken up quite a bit of Brown's time he drops below to have a look at the condenser that is causing the trouble. Then by taking what he sees and dividing it by two and extracting the square root, or some other such method known only to engineers (for I am not permitted to divulge any secrets of the klan), he goes back to the yard with his answer.

That all sounds easy. But wait, the bid goes in for the work and the firm's competitor gets the job!

The "Old Man," through some unknown source, has learned that upon actual examination there were only three

The Gang at the Keyhole

tubes leaking, a fact which the worthy competitor knew, but Brown, who had thought and said fifteen, did not.

The answer is this: The chief engineer had given Brown an earful of gas, the mate had told him all of his woes, the captain had given him a couple of cigars and his own "Old Man" gives him h—l.

And that is another interesting phase of the business. There is yet another, probably the most interesting of all, especially to those directly concerned.

A man, or group of men, buys a ship. The ship in an old ship that has given up going to sea years ago and is peacefully living out its days on some mud bank. This group of men conceives the notion that there is a fortune to be made by fixing up the old ship and running her out to Kalamazoo or some other sea port and comes to the yard, asking for a price on the work necessary to make her all new and shiny again.

The price with all the necessary dope must be ready by a certain day and hour, so Brown and the rest of the gang hop to it. Drawings are made, weights are figured both correct and incorrect. Everybody hustles, even the boy is made to realize the importance of the thing. So it goes day and night until the fatal hour arrives and with it the "big wigs" who started all the trouble.

The "Old Man," in his best business manner, goes over every detail with the utmost care. The "big wigs" are very much interested until the very end and then, after thanking the "Old Man" for his courtesy and interest in their behalf, gently inform him that they do not intend to have the work done, but had only wondered what it would have cost.

It is then that the gang, who have been listening at the keyhole, take to the tall timber until the storm blows itself out.

The above are three of the reasons why I say the most interesting job in the yard is in the engineer's office. For to be an engineer one must know his own business and a bit of everyone's. He must be courteous to his competitors and willing to take a gambling chance. He must be so optimistic and thick skinned that he is immune from knocks and, above all, he must be able to shed his troubles like water from a duck's back. However, it is a good old business even if an angry engineer with poetical tendencies did remark the following:

Oh an engineer's life is a jolly life,
As jolly as jolly can be.
Damned if you do, damned if you don't,
That's what happens to me.

Philadelphia, Pa. JOHN J. STRUTT.

Wage Subsidy Proposed for the Merchant Marine

(*Concluded from page* 804)

The conclusion of American shipowners is that the leverage of the high level of the American wage standard can be exerted only in the case of vessels with a terminus at a United States port, whereas a vessel that operates from a European terminal, as do most of those under foreign flags, will inevitably derive an advantage from a difference in wage standards. This, say the operators, is proving to be the case even with British vessels that run on a triangular route, one leg of the voyage reaching Great Britain. Logically it might follow that, if the effect of the seaman's law in the United States has been to increase the wages of seamen, firemen, etc., and thereby force up the pay of officers, in order that the proper relationship be maintained, the same indirect pressure would be communicated to the British marine. But the United States shipowners insist that even if the higher American standard has automatically pulled up the wage of British enlisted seamen, etc., this same leverage cannot be applied in the case of British officers for at least four or five years to come or until such time as the surplus of officers now available in England has been absorbed.

While disclaiming any desire or intention to interfere with the American wage scale, United States ship operators who have voiced in Washington the sentiments of the shipping industry have emphasized the fact that it would be greatly to the advantage of the American merchant marine if wage inequalities could be relieved by such a plan as the Butler Bill contemplates instead of relying upon the development of superior efficiency on the part of American operatives to overcome the handicap.

Electrical Equipment for Erie Canal Motor Barges

THE General Electric Company, Schenectady, N. Y., has recently supplied the electric auxiliary equipment for five Diesel engined barges, built by the McDougall Duluth Shipbuilding Company, Duluth, Minn., for the Erie Canal Transportation Company of New York.

The barges are 250 feet long, 36 feet beam and 10 feet draft, each being equipped with a 140 brake horsepower direct reversible Skandia Pacific Diesel engine. The displacement of each barge is 2,150 tons, the block coefficient 0.86 and the midship section coefficient 0.9833.

The electric equipment consists of three 10 kilowatt 400 revolutions per minute generators each driven by a 15 horsepower Diesel engine for auxiliary power and lighting on each barge. There are also seven electric motors ranging from 1 to 10 horsepower to be used on pumps, steering gear, windlasses, etc.

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Timbers and Lumber for Shipbuilding Purposes—III

By Horace Holden Thayer*

Continuation of a series of articles containing information regarding shipbuilding materials and their uses that is not readily obtainable from shipbuilding handbooks and other generally available sources. The articles are not intended to be a complete exposition of the subject but will be found to contain items of value to the classes of workers who have to deal with these materials from the materials point of view.

POINTS of particular interest which have come under the writer's observation in connection with the use of the woods previously mentioned will now be considered under the heading of the construction member concerned.

Decking

Edge Grain should always be specified for a Douglas Fir calked deck, and it is preferable for a Yellow Pine deck.

Decking of the same dimensions both ways allows the selection of the upper face from any of the four faces, thus largely taking care of the edge grain requirements.

To avoid damages in transit decking should be surfaced at the shipyard.

The tendency is to outgage too much for calking. For decking 4 inches or 5 inches thick an outgage of 3/32 inch tapering off to nothing to a depth of 2½ inches, which will make a seam that is theoretically 3/16 inch wide at the face, is plenty; or for thinner planks an outgage of 1/16 inch tapering off to nothing half way through the plank is a good rule.

There is considerable difference of opinion regarding the relative merits of calked wood decking or tongue and groove canvas covered decking for the exposed tops of houses and other superstructure of a vessel. Both have their merits and such considerations as tropical service, traffic on the deck, location of the deck with regard to the stack, etc., have to be taken into account. For fair comparison and also as a standard of good practice the calked decking should not be less than 2¼ inches thick when finished and the joiner decking not less than 1⅜ inches.

Floors and Frames

In a wood ship the lowest framing members are called floors, the timbers butting against them, first futtocks, and so on up to the deck where the last futtock of each frame member is usually called the top timber. Where the bottom of the vessel has a considerable deadrise and the lowest frame members butt close to the keel, they are often called naval timbers.

The conventional steel ship midship section which is best for ease of propulsion, with small deadrise and small bilge radius adds to timber schedule difficulties. It makes floor timbers of the lengths desired by the classification societies and bilge futtock timbers of the necessary width and length difficult to obtain. This does not trouble the West Coast builders as much as others.

A vessel framed with White Oak is under a weight handicap as compared with one framed with Yellow Pine and both are under a handicap as compared with one framed with Douglas Fir unless the scantlings of the heavier woods can be proportionally reduced.

As previously mentioned salting may be required with White Oak framing where it would not be required with Yellow Pine or Douglas Fir. This with a large vessel means a reduction in the deadweight of a good many tons.

The possibility of bad results from mixed framing, or the use of two species of wood, in building up the frames has been referred to.

Where natural crooks cannot be obtained for the bilge futtocks the classification society may call for compensation in the shape of additional timbers or the edge bolting of the bilge planking. Natural crooks should as far as possible be used for all frame futtocks of sharp curvature.

A shipbuilder can get the most out of such timbers as frame futtocks by ordering flitches, which are merely slabs sawed to the desired thickness for the siding of fore and aft dimension of the frame and with the bark left on the other two faces. Except where furnished to templet the width specified to be furnished should be present at the narrowest point inside of the bark. The width for invoicing is usually the average of both faces at the midlength. The value of templets has been previously mentioned.

The reduction in the molded size of frame timbers at the butts, allowed by the classification societies, can also be taken advantage of in getting out difficult curved timbers.

Preparation of a frame molding plan in which the framing timbers are laid out as they will appear in the finished vessel is often of value. Sections are taken at proper distances apart to allow the timbers ordered from any section to take care of all frames up to those taken care of by the adjacent sections. In ordering timbers in this manner an allowance for the bevel of the frames must not be overlooked.

Green timbers should always be used for the steamed and bent oak frames of small vessels. The steam drives out the sap and when the frames dry they will hold their shape for years. If seasoned oak is used it will soon lose its shape at least sufficiently to destroy the attractive appearance of the sheer line of the vessel.

Joinerwork

All boards should be kiln dried.

When ordering tongued and grooved material it is important to specify the finish that will meet the requirements of the particular case in accordance with the standards of the mills, as for instance D. & M. for sheathing of which only one side is exposed and S2S CM for decking.

Knees

Knees should be natural crooks in order that they will not split, and only those woods are suitable which are tough and have good holding power for fastenings. Root knees are the best and where a tree grows on a slope the uphill side supplies the closed bevel knees and the downhill side the open bevel knees.

Steel knees can be obtained or made up and are entirely satisfactory in locations where not covered with timbers which would interfere with their proper fastening.

Beam knees can in many cases be advantageously supplanted by additional strength in the shelves and clamps.

Masts and Booms

During the recent war the following procedure was adopted with classification society approval covering the changes in diameter wherever measured of masts and booms which had

*Member of Rossell & Thayer, naval architects and marine engineers, Philadelphia, Pa.

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been specified to be of Douglas Fir and for which the other woods listed might be desired, all being graded similarly for knots and other defects.

	Percent Increase	Percent Decrease
Dense Southern Y. P.	..	10
Southern Y. P., not dense	0	0
Norway Pine	5	..
Spruce	30	..

PLANKING

Lengths should be to satisfy classification requirements and any deficiency in this regard can only be compensated for, if at all, by extra fastenings. The ordering of the planking and ceiling of large vessels in specified lengths rather than in the customary way of 30 feet and up, average 36 feet, etc., will help in securing a proper shift of butts; but such procedure is generally unnecessary and inadvisable.

The wider the planking, the less the labor, fastenings and calking. Bottom planking can usually be made quite wide.

Planking is preferably ordered S1S2E, surface one side and two edges; and where there is any sap, the surfaced side should be the sap side, and the heart side should be placed against the frames, notwithstanding the fact that sapwood is objectionable in calking edges. The reason for this has been explained under "Length of Life" of the timbers.

Some of the planking of upperworks should be ordered in greater widths than shown on the midship section plan on account of the sheer and flare.

The remarks under Decking regarding outgaging apply also to Planking. Outgaging is preferably done at the shipyard.

For wood tugboats and other wood vessels subject to rough service and a good deal of knocking about, White Oak planking is very desirable and will keep down maintenance charges.

PLANKSHEERS

The working out of difficult curved pieces of plank sheers, rails and similar parts of the work from timbers of limited width can be helped by the use of anchor stocks instead of the regulation scarf. The anchor stock is a piece of timber which fits into both connecting members exactly as one half of a scarf on one member fits into the other member.

RUDDER

Ironbark and Greenheart are good rudder stock woods, selected northern White Oak can generally be relied upon, but the southern White Oak has little torsional strength and when severely stressed reaches a condition where it can be twisted around without turning the rudder.

A steel stock on a wood rudder is a good combination on a wood ship back of a wood rudderpost. The complete steel rudder is costly, very heavy for the overhang to support, and unless built to suit the width of the rudder post has considerable ineffective surface.

SHAFT LOG

White Oak is a good wood for this on account of its high holding power for fastenings notwithstanding its tendency to check.

SILLS

Oak is not a good material for outside sills and similar service where watertightness is desired of parts that are usually kept very dry. This is on account of the before mentioned tendency to check badly.

STEM

The outer stem of a wood vessel is preferably of hardwood, such as White Oak and the stem gripe at the bottom, or piece between the stem and the keel should be of hardwood. For the latter all species of oak, hard maple, beech, birch and other hardwoods that will last well under water may be used.

The stem gripe may often be done away with by extending the stem timber downward, and while the longer timber may be more difficult to obtain the gripe piece will often prove still more so.

STERN POST

The stern post of a single screw wood steamship has to be cut from a timber or timbers much larger than the finished post, on account of the shaft boss. This results in exposing the wood near the center of the stick that with oak often has bad heart shakes and other defects which are likely to cause the condemnation of the timber after a great deal of work has been put upon it.

Although White Oak is otherwise the proper wood to use in the east, Yellow Pine of increased fore and aft dimensions can be substituted for it, whether a single timber or built up.

On the west coast, propeller posts of the largest size likely to be required can be made from one piece of medium growth clear butt Douglas Fir.

TREENAILS

Woods for treenails have to be strong, tough, hard, straight grained, non-porous and of approximately the same volume whether wet or dry. The approved woods are Yellow or Black Locust, Iron Bark, Osage Orange or Bois d'Arc, and Live Oak. The Live Oak has the undesirable property of sometimes shrinking to an oval shape when seasoning, thus requiring re-turning. White Oak is occasionally approved for service below the light waterline and should give satisfaction in such service when properly driven. Beech treenails may be approved in the bottom planking to a height not higher than the heads of the floors.

Treenails used for pinning the two members of a double frame together, to assist in holding the parts in place while the framing is being erected and before the ceiling and planking fastenings accomplish this purpose, may be of the same material as the frames, subject to classification approval.

The average shrinkage in crossection, or the volume shrinkage, from a green to an oven-dry condition of the principal woods used or proposed for treenails, as determined by the Forest Service, is as below given. The shrinkages from a green to an air dry condition are about one-half of these amounts. The figures are in percent of the dimensions when green.

Osage Orange	8.9
Black Locust	9.8
Live Oak	14.7
White Oak	14.3 to 16.9
Beech	15.8 to 16.5
Hickory	15.0 to 21.2
California Eucalyptus	22.5

Hickory and California Eucalyptus are more permeable to water than the other woods in addition to their being subject to greater change in volume, and as before mentioned are not good treenail woods.

White Oak treenails should be kept in a vat of hot creosote for at least 24 hours before being driven.

As of interest for comparison and from the fact that the woods are used for pinning frame members together, we find the following corresponding shrinkages:

Long Leaf Yellow Pine	11.0 to 12.8
Douglas Fir (Washington and Oregon)	12.3 to 13.2

As previously stated shrinkage of wood along the grain is negligible, and the shrinkage of treenails or other members across the annual rings is only about one-half of the shrinkage along these rings. Therefore, for best results, when driving treenails the annual rings of the treenail should be turned perpendicular to the grain of the planking and ceiling through which they are driven.

Treenails are preferably tapered, the point being 1/16 inch less in diameter than the head when up to 30 inches long and 1/8 inch less when 30 inches long and over. They should

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be driven into a hole one-half of which is bored about 1/16 inch less in diameter than the head of the treenail and the other half enough smaller to be a good tight fit for the point of the treenail. Treenails of this character of hexagon shape are on the market and meet with classification approval. If the tapered treenails cannot be readily obtained or made, the treenails may be turned in two drifts, one half being 1/16 inch less in diameter than the other half; and the hole is made in two drifts to correspond. This enables long treenails to be driven without brooming and splitting. Short treenails can be satisfactorily driven by a competent workman when of uniform diameter throughout. All treenails should have a bevel at the point.

Where the shipbuilder is equipped to re-turn the treenails it is preferable to order them rough turned to 1/16 inch over the normal diameter. This will take care of any irregular shrinkage and also allow the builder to accommodate the finished diameters to the wear of the augers used for boring the treenail holes.

Treenails should be ordered at least 4 inches longer than the combined thickness of the material through which they are to be driven. This allows something to come and go on in the driving fit and also allows of sawing off ends which may have been damaged in driving.

The following specifications prepared by the Forest Service for use of the Emergency Fleet Corporation are of value in ordering treenails.

TREENAIL SQUARES

All squares to be entirely free of spike knots and knots in clusters, and to be sound except for the following defects which will be allowed. Sound material excludes squares containing worm holes which cannot be removed in turning, any form of rot or decay, powder post, and incased bark.

1. Sound knots, the aggregate diameter of which does not exceed ½ inch in each and every 12 inches of length, provided no knot is larger than ¼ inch in average diameter and no ¼ inch knot is closer than 2 inches to any other knot.
2. Cross or spiral grain not exceeding in slope more than 1 inch in a length of 20 inches.
3. Season checks, splits and shakes extending into the treenail for a distance not exceeding 1 inch on each end.
4. Sap on one end not exceeding ¼ inch in thickness on any face or ⅜ inch on any corner for a distance of not more than ¼ the length of the piece.

(Sap, in addition to that allowed in item 4, wane surface, worm holes, or similar defects which, in the judgment of the inspector, can be removed in turning the treenail will also be allowed. Iron streaks will not be considered defects.)

SIZE

Squares to be cut to sizes specified, allowing 1/16 inch variation in thickness and width and ½ inch in length.

FINISH

All squares to be rough sawn.

TURNED TREENAILS

To be thoroughly seasoned (approximately 15 percent moisture). All treenails to be entirely free of spike knots, knots in clusters and to be sound. All treenails to be entirely of heartwood, except as allowed below. The following defects will be allowed. Sound material excludes treenails containing worm holes, any form of rot or decay, powder post, and incased bark.

1. Sound knots, the aggregate diameter of which does not exceed ½ inch in each and every 12 inches of length, provided no knot is larger than ¼ inch in average diameter and no ¼ inch knot is closer than 2 inches to any other knot.
2. Cross or spiral grain with a slope not exceeding 1 inch in a length of 20 inches.
3. Season checks, splits and shakes extending into the treenail for a distance not exceeding 1 inch on each end.
4. Sap not exceeding ⅛ inch in thickness nor more than ¼ the length of the treenail on the pointed end only.

(Iron streaks will not be considered a defect. Dips in the grain, which at the maximum slope do not exceed the allowable cross grain will be permitted.)

The foregoing specifications do not obviate the necessity for inspection of the material. Also sound pieces of approved species of wood that would pass them might be light in weight and very far below the normal strength of the species.

Treenails are wedged at the ends in order to produce the same result as the head on a driven bolt and where possible the treenails should be driven all the way through and wedged on both ends. The wedge should be set across the grain of the wood through which the treenail is driven so as to have no tendency to split this wood. The necessity for wedging the ends of treenails is one of the reasons why treenails have to be of a harder wood than that through which they are driven. Where treenails are of the same wood as the planks, they are so much lower in compression across the grain than the plank is in compression along the grain that the wedging crushes the treenail instead of expanding it into the plank.

In many cases where treenails cannot be driven through and wedged on both ends it is desirable to "fox" them; that is, a wedge is fitted in the inner end of the treenail and driven home against the bottom of the hole by driving the treenail home.

Wedges should be of a hard, long lived and close grained wood. White oak is very desirable although dense yellow pine heart wood has been used to a considerable extent with classification approval.

A good rule for treenail diameters is:

Thickness of Outside Planking	Diameter of Treenails
2 inches and under	⅞ inch
2½ inches	1 inch
3 inches and 3½ inches	1⅛ inches
4 inches and 4½ inches	1¼ inches
5 inches and 5½ inches	1⅜ inches
6 inches and over	1½ inches

ORDER OF SHIPMENT OF HULL MATERIAL

If the timbers ordered for a wood ship are required for prompt use it is even more necessary to specify the order in which they should be received than for a steel ship; because otherwise the mills will ship first what they can most readily get out, and this is invariably the light stuff that is not needed until the last. A good general guide is as follows, the staging material, keel blocks, ribbands and shores being assumed to be on hand.

First Shipment

Mold material
Keel and keel shoe
Stem and stem gripe
Stern frame
Floors and frames
Chocks
Cross spalls
Knightheads and apron
Deadwoods
End framing
Keelsons and machinery foundation timbers
Horn timbers
Shaft log
Rudder blade and stock

Second Shipment

Bottom, bilge and side ceiling
Clamps and shelves
Hold beams
Deck beams
Knees
Deck girders and hatch coamings
Stanchions
Hatch strongbacks
Deck waterways
Riders, pointers and breast hooks
Garboard planking
Bottom, bilge and side planking
Poop, bridge and f'c'stle shelf, clamps and plank sheer

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Poop, bridge and f'c'stle ceiling
Poop, bridge and f'c'stle beams
Bulkheads
Coal bunkers
Shaft tunnel
Wood bitts
Calked decking
Poop, bridge and f'c'stle and bulwark planking
Main rail
Fenders
Bilge keel
Deck machinery foundations

Third Shipment

Sills and plates
House studding
House carlins
Tongued and grooved decking
House sheathing, outside and inside
Partitions
Hatch covers
Secondary rails

THE AMOUNT OF WOOD IN A WOOD VESSEL

On account of the nature of the material dealt with, the great number of different methods of putting it together in a wood vessel, and the differences due to the use of different species of wood, it is difficult to determine in advance without a detailed calculation the amount of timber that will be required for any new design; and even with a detailed calculation there are many items that are difficult to correctly estimate. Approximations can, however, be made along the lines of those for the amount of steel in a steel vessel which were given in an earlier paper.

The schedule of timbers and lumber required for the yellow pine Standard Wood Steamship of the Emergency Fleet Corporation as originally designed totaled about 1,420,000 board feet. This does not include the knees and treenails or any material not a part of the vessel itself. The length at the deck level from the forward side of the stem to the after side of the rudder post is 268 feet, the breadth is 45 feet 2 inches and the depth molded is 26 feet. The product of these dimensions multiplied by the coefficient 4.5 gives the board feet.

The corresponding schedule of the sister ship built of Douglas Fir totaled about 1,670,000 board feet, giving a coefficient of 5.3. This 17¾ percent increase over the Yellow Pine ship is somewhat more than it should be because the framing of the latter was reduced in size more than was warranted by the relative strengths of the woods, in order to arrive at sizes that could more readily be obtained in large quantities.

A somewhat larger Yellow Pine steamship which has a steel center keelson shows on the same basis a coefficient of about 4.0 and a Douglas Fir steamship of about the size of this latter with a wood center keelson but a steel sheerstrake, waist and deck stringer plate has a coefficient of about 4.5.

Other designs of about the size of the Standard Wood Steamship, built of Douglas Fir, have coefficients from 4.8 to 5.5, on the same basis.

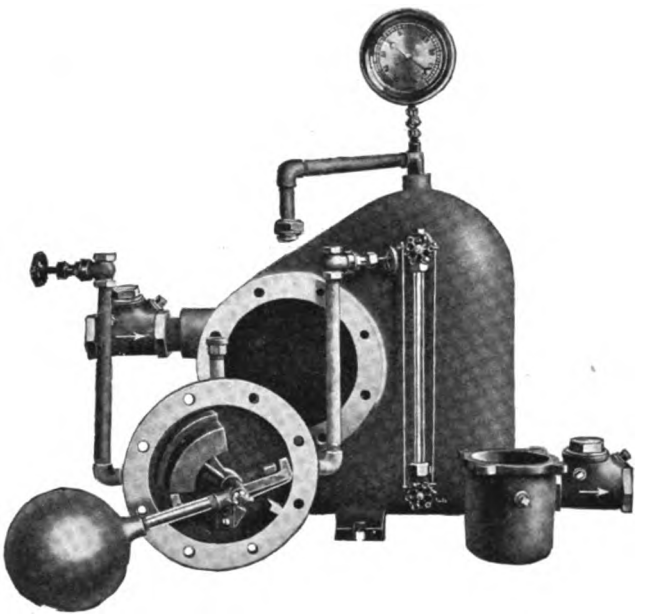
The schedule of timbers and lumber required for the Standard Wood Schooner Barge of the Emergency Fleet Corporation totalled about 710,000 board feet. The dimensions corresponding to those of the Standard Wood Steamship before given, are 229 feet 5 inches by 37 feet 0 inches by 20 feet 6 inches. The product of these dimensions multiplied by the coefficient 4.1 gives the board feet of timbers and lumber. These barges were classed and designed to be built of either Yellow Pine or Douglas Fir; so this amount might properly be considered to be the requirement for the latter.

Barges similar to the above built in New England before the war of Yellow Pine, with a considerable amount of hardwood framing, had timber schedule requirements of only 560,000 board feet. Corresponding dimensions were 229 feet 5 inches by 37 feet 9 inches by 21 feet 0 inches, with corresponding coefficient of 3.1.

The foregoing figures while of value in enabling one to arrive at a rough approximation of the actual requirements, show clearly the great variations even with vessels of the same size and type.

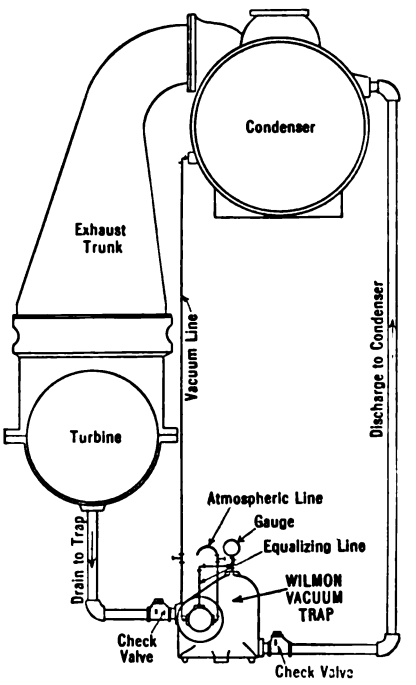
Vacuum Trap Used for Turbine Drainage

WHILE Commander Vaughn V. Woodward, U. S. N., was chief engineer of the steamship *Leviathan* during the war he perfected and installed what was then a new type vacuum trap for draining the two low pressure



Wilmon Vacuum Trap, with Cover and Float Mechanism Removed

turbines and replacing the customary main air pump drainage of these turbines. Recently this apparatus has been produced commercially by P. H. Gill and Sons Forge and Machine Works, Brooklyn, N. Y., under the name "Wilmon Vacuum Trap." In its development the vacuum trap has been found satisfactory for lifting and when equipped with a counting device to perform the functions of a meter. The trap has also been found suitable for draining apparatus under vacuum such as condensers, evaporators, cooking kettles and the like.



Method of Draining Steam Turbine Through Vacuum Trap Into a Condenser Located Above the Turbine

In marine installations where the common practice is to deliver the condensate at a higher point of discharge and to drain the turbines directly into the main air pump the use of the vacuum trap eliminates the use of the main air

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pump by leading the turbine drains through the trap to the condenser.

While the water is collecting in the trap the receiving chamber is under vacuum, and during the discharge cycle the trap is open to the atmosphere. These changes of pressure are brought about in the receiving chamber by an oscillating disk covering three ports, which shifts from one position to another with the rise of the water in the trap acting on a hammer weighted float mechanism connected to the disk lever. When the water reaches a certain level in the trap the disk closes the vacuum line to the receiver and opens it to the atmospheric and equalizing line. If the outlet is connected to a vacuum as in the case of a condenser the water is forced out of the trap; otherwise it drains into the atmosphere by gravity. As the water falls the oscillating disk cuts off the atmospheric line and connects the vacuum and equalizing lines, allowing the water to collect again from the turbines.

The capacity of the trap is limited only by the size of the inlet and outlet openings. The 2-inch trap, for example, handles 1,800 to 2,100 gallons of water per hour. This capacity varies depending on the lift of the discharge.

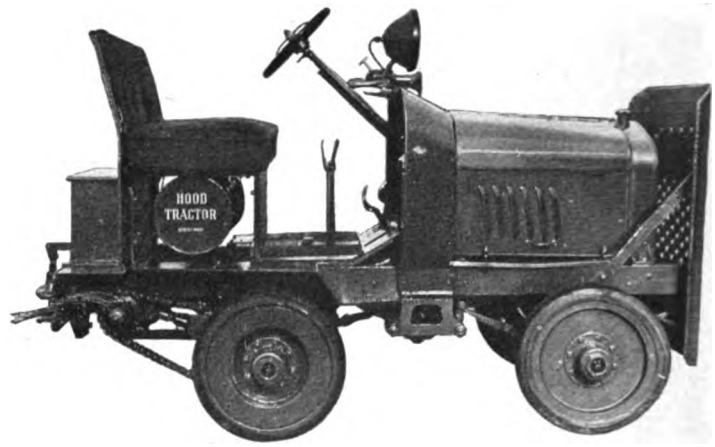
Combination Ore and Oil Steamer G. Harrison Smith Delivered to International Petroleum Company

THE *G. Harrison Smith,* a 20,000-ton combination ore and oil vessel built at the Sparrow's Point plant of the Bethlehem Shipbuilding Corporation, Ltd., for the International Petroleum Company, was delivered to her owners on September 12, after a very successful trial, which was run on August 30 at Sparrow's Point, Md.

The vessel has a length overall of 571 feet 6 inches, a breadth of 72 feet and a depth of 44 feet. She is equipped with three single ended Scotch boilers and triple expansion reciprocating engines with cylinders 25, 41 and 68 inches diameter and 48 inches stroke. The boilers are equipped with the Bethlehem-Dahl mechanical oil burning system fitted with Howden type of forced draft.

Tractor Speeds Up Freight Movements in Pier Transit Sheds and Warehouses

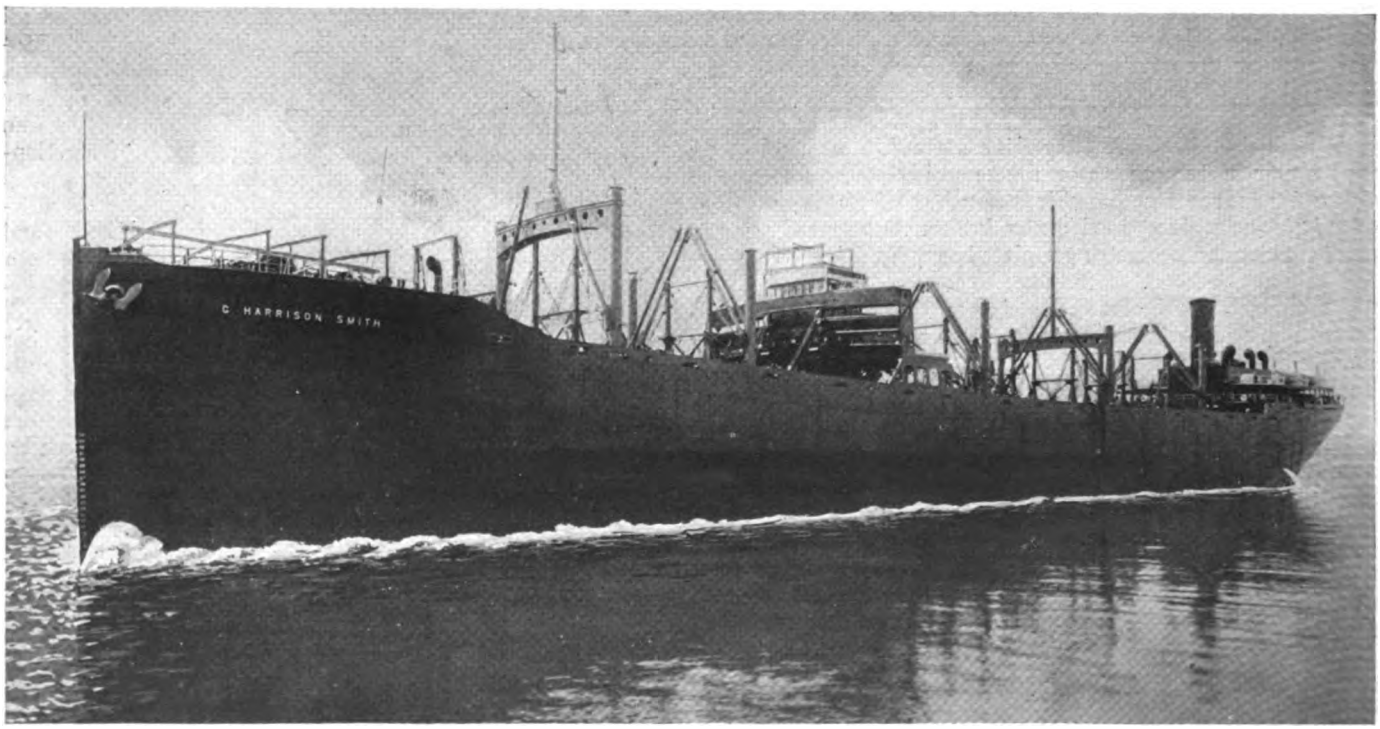
AT the October convention of Port Authorities in Seattle, Wash., a new model tractor, manufactured by the Hood Tractor Company, of Seattle, was demonstrated. This machine has been specially designed for dock and warehouse handling of freight on trailer trains as well as the shunting of freight cars on pier sidings. A special steering gear allows the tractor and ten trailers in a train to turn on



Hood Tractor for Marine Terminal Service

a platform or aisle 12 feet wide. The manufacturers claim that all ten trailers can be turned at right angles from one aisle 6 feet wide to another 6 feet wide. The bumper is so designed that wherever the bumper passes the balance of the machine will pass.

The tractor is also used for spotting and switching cars on the docks. The motor is 22½ horsepower; the tread of the tractor is 36 inches and the wheel base 43 inches. As the motor is running nearly all the time while the tractor is in service an over size radiator is provided and a specially designed water pump which prevents overheating. The weight of the entire machine is 2,900 pounds.



20,000-Ton Combination Ore and Oil Steamer G. Harrison Smith

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The New Sulzer Diesel Engine

By A. P. Chalkley

Among the very large number of different types of Diesel engine, which are now being installed in ships in Europe, the Sulzer design has attracted a vast amount of interest. In the latest Sulzer engine a considerable advance appears to have been made. The first two sets of the new design have just been completed at the Winterthur Works and are now being installed in a 9,000-ton deadweight motorship which will probably go on trial before the end of the year.

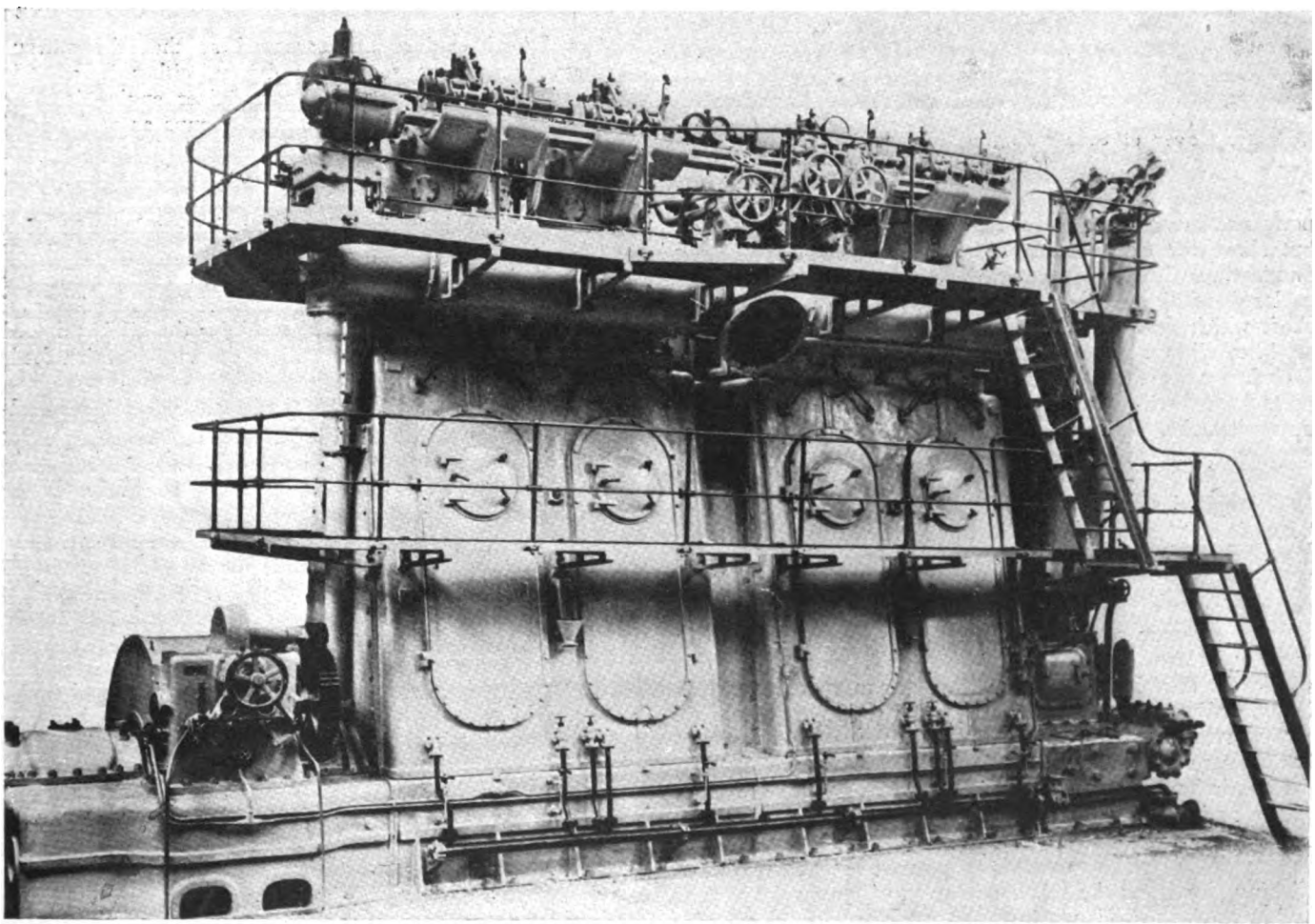
THE advantages of the employment of the two cycle principle in large marine oil engines cannot be ignored, particularly when, as in the new Sulzer motor just brought out, all possibilities of cylinder cover cracks developing owing to the heat stresses are eliminated.

This engine, of which illustrations are given as built for a 9,000-ton motorship, has an output of 1,350 brake horsepower at 95 revolutions per minute and it is worthy of note that the builders are now willing to manufacture similar motors up to 6,000 brake horsepower in six cylinders, under the usual guarantee. The cylinder dimensions are 630 millimeters bore and 1,060 millimeters stroke and the weight is in the neighborhood of 150 tons which is considerably lower than that of a corresponding four cycle motor.

Before describing the general features of construction, the scavenging system, which has now been introduced for the first time, may be mentioned. In the ordinary way with a two stroke Diesel engine, scavenging air is supplied at the requisite pressure of about 2 to 3 pounds per square inch from a large pump driven from a crank on an extension of the main engine shaft. This pump running at say 100 revolutions per minute (or whatever the speed of the engine may be) is naturally of bulky construction, is heavy and has the disadvantage of adding a further crank to the engine unless it be driven by means of beam levers from a crosshead which has other disadvantages. Moreover the scavenging air is not under control and, until the engine has started up, no scavenging air is available for the working cylinders, while the pressure cannot be raised if desired.

Separate Turbo Scavenging Blower Provided

The designers have in this new type entirely abandoned the engine driven scavenging pump, which incidentally absorbs about 10 percent of the power, and the scavenging air is supplied from a separate turbo scavenging blower running at about 2,000 revolutions per minute. The electric motor is of 150 brake horsepower and in normal circumstances one set supplies sufficient air for operating two engines in a twin screw vessel while a second blower is pro-



The New 1,350 Brake Horsepower Sulzer Marine Diesel Engine with Turbo-Scavenging

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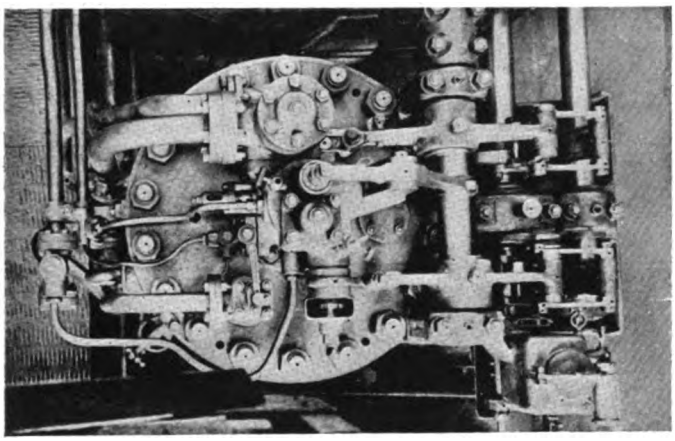
vided as a stand-by. The result is that the engine is shortened and rendered lighter, while 8 to 10 percent is added to the power delivered by the propeller shaft. As regards cost there is probably little difference between the turbo system and the adoption of an engine driven pump, but the makers consider the advantages sufficiently numerous to have standardized the arrangement in all their engines of about 1,000 brake horsepower and over.

CYLINDERS SUPPORTED BY CAST IRON FRAMING

Turning now to the general features of the design it is a curious fact that while the Sulzers were the first to adopt the construction by which the cylinder stresses are taken by long through bolts extending from the bottom of the bearings to the top of the cylinders, and were followed in this design by most other Diesel engine builders, they have now abandoned it and the cylinders are supported solely from the cast iron framing. At the level of the bottom of the cylinders, as seen in the illustration, is a long scavenging trunk into which the scavenging air is delivered from the turbo blower. In the cylinder walls are cut the exhaust



Cylinder Cover of Sulzer Engine, Showing Valve Operating Mechanism

ports on one side and the scavenging ports on the other but above the main scavenging ports is a second set communicating with the scavenging trunk through rotary valves enclosed within the latter and operated from the vertical shaft which drives the camshaft. The object of this upper set is to allow a supercharge of scavenging air to enter the cylinders after the exhaust ports and the main scavenging ports have been closed by the piston in the course of its upward stroke.

CYLINDER COVER DESIGN

The cylinder cover is of interesting and unusual design. There is only one hole bored in the cover into which is fitted a cage arranged for the reception of the fuel valve, the starting valve and the relief valve. This is perhaps one of the neatest features of the Sulzer engine for it renders possible a very symmetrical cylinder cover design which would scarcely be feasible in any other way. The starting valve within the cage is not actuated from a cam on the camshaft in the ordinary way but is opened at starting by a cam on a maneuvering spindle and actuated by the starting mechanism. There is a secondary air inlet valve which controls the admission of starting air to the cylinders via the main valves and which is itself operated from the camshaft by cam and lever in the ordinary manner. One of the main objects of this arrangement is to prevent the starting valve sticking, for it can be taken out at any time on the voyage and cleaned since it is not in communication with the cylinder while the engne is operating on oil.

VALVE OPERATING MECHANISM

The valve operating mechanism in this engine is greatly simplified by the employment of port scavenging. The fuel valves and auxiliary starting valves are actuated by levers from a camshaft in the ordinary manner and there are two cams side by side for ahead and astern running respectively. Instead of moving the camshaft fore and aft, which is the customary method with most four cycle Diesel engines, there are two rollers on the end of each valve lever, either of which can be brought in contact with its cam, one for ahead and one for astern operation. When the ahead cam is in contact with its roller, the astern cam is out of contact with the astern roller and vice versa, the movement being controlled by the reversing wheel at the control platform. In reversing, the reversing wheel is turned bringing the astern cams into operation and the starting lever is moved, causing the main starting valves to be opened and admitting compressed air to all four cylinders. Without the attendant carrying out any further operation two cylinders are next automatically cut off from air and put on to fuel and finally all four cylinders on fuel, the main starting valves being then closed and the auxiliary starting valve levers out of contact with their cams.

A new point in the design which has not been adopted with other engines is a means by which the lift of the fuel valve can be increased or decreased according to the speed and power of the engine. It will be noticed that the engine controls are arranged at the top of the engine but this is not essential and they can be grouped at the bottom in the ordinary manner, if desired. All the starting gear is of course interlocked so that the starting lever cannot be moved until the cams and levers are set for running either in the ahead or astern position.

PUMPS AND COMPRESSOR DRIVEN FROM MAIN ENGINE

Most Diesel engines are arranged so that the various auxiliary pumps are separately driven, either by electric motors or steam engines. The new Sulzer engine is more self-contained and the lubricating oil pumps as well as the circulating pumps for piston and cylinder cooling water and, of course, the three stage air compressor are all operated from the engine itself.

A novelty has been introduced by the employment of a separate lubricating pump for lubricating the crosshead, oil being supplied at high pressure (200 to 250 pounds per square inch) to all the main crossheads. The remainder of the lubrication is virtually by gravity for the oil is pumped from a sump up to a tank well above the engine which feeds the various points to be lubricated.

Fresh water is utilized both for pistons and cylinder cooling, although it is now not unusual to adopt fresh water cooling for the pistons and in the Burmeister and Wain latest design fresh water is used throughout. Obviously the sea water system is more convenient, since it avoids the necessity for fresh water coolers in the engine room. The cooling water is delivered to the pistons through a telescopic pipe on one side of the rod and is discharged through a similar pipe on the opposite side. As none of the moving joints is under pressure leakage is improbable.

One of the major advantages of this engine is stated to be its capacity for using crude oil such as is burned under boilers. The reason given is that as there are no exhaust or scavenging valves in the cylinder cover there is no possibility of their becoming corroded as in a four cycle motor and that apart from the fact that there must necessarily be somewhat more wear on the liner owing to the larger asphalt content in the fuel, there will be no difference in operation, whether the engines be run on Diesel oil of low specific gravity, or fuel oil. This claim is far reaching and, if it can be justified in practice, it will be a considerable asset since Diesel oil is nearly 50 percent dearer than fuel oil.

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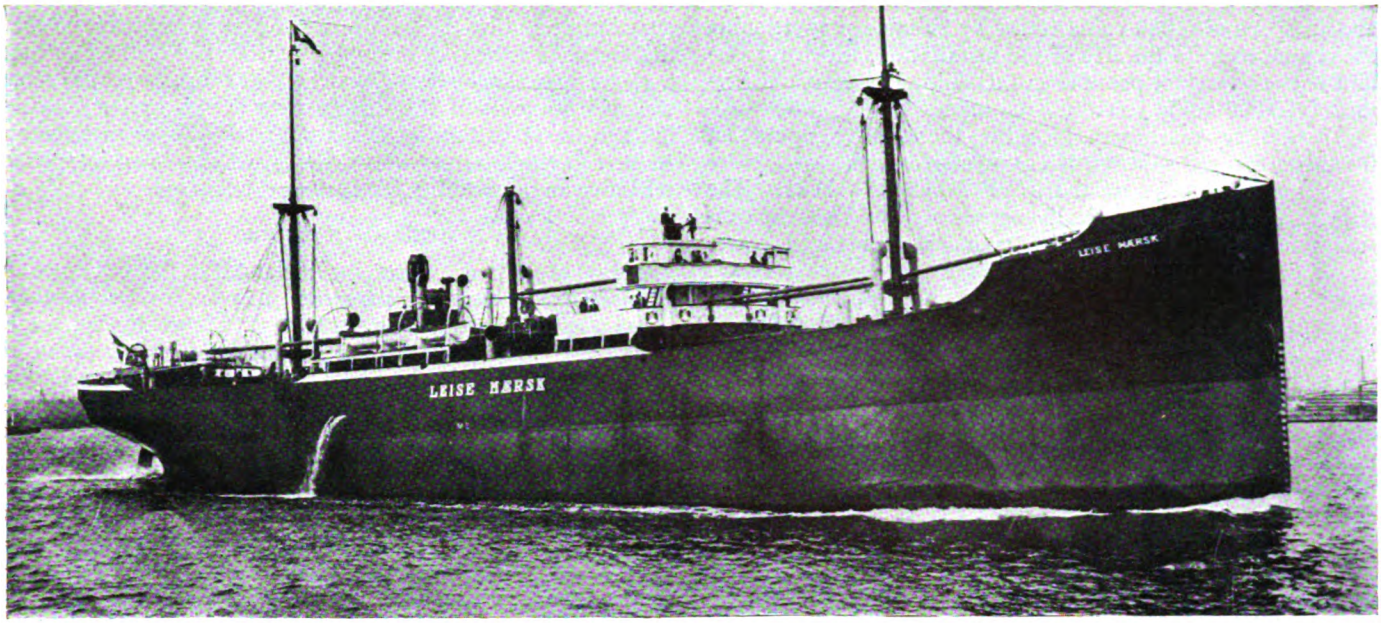

Leise Mærsk, the First Large Motorship to Be Fitted with Burmeister and Wain Long Stroke Engine

Motorship Building in Europe

By Our Special London Correspondent

Something of a sensation was caused in European shipping and shipbuilding circles a short time ago when the first large geared Diesel liner sailed on its maiden voyage. From an engineering standpoint the machinery installation is one of the most remarkable that has yet been carried out on any vessel afloat. This article briefly explains how high speed submarine engines have been successfully adapted to the propulsion of a 12-knot cargo vessel.

It has already been remarked in these columns that the utmost secrecy is being observed regarding motorship construction in Germany and few people were even aware that two 12,000-ton motorships were being built for the Hamburg-American Line in which geared Diesel engines are installed. The vessel which has just been completed is the *Havelland,* built by Blohm and Voss, Hamburg. A sister ship, the *Munsterland,* was launched in August and presumably will be placed in commission before the end of the year.

The *Havelland* has the following principal dimensions:

Length over all	465 feet
Length between perpendiculars	450 feet
Breadth	58 feet
Side height to main deck	29 feet 6½ inches
Carrying capacity	10,235 tons
Draft	25 feet 1 5/16 inches
Gross registered tonnage	6,308 tons
Net registered tonnage	3,829 tons
Oil capacity (fuel)	1,400 tons
Speed	12 knots
Shaft horsepower	3,300

The ship is of the well deck type with long poop and forecastle; she has two continuous steel decks and is built to the highest class of Germanic Lloyds. There are eight watertight bulkheads extending to the main deck. Accommodations are provided for twelve passengers.

The Main Engines

The two main engines are of the four stroke cycle type and were built for submarines during the war by the Augsburg works of the firm Augsburg-Nürnberg. The firm of Blohm and Voss is licensed by this firm to build these engines and has already built several, two of which have been in use in its power plant for several years.

Each engine has ten cylinders, 20⅞ inches diameter, with a stroke of 20⅞ inches. The number of revolutions, which was to be 390 for submarine propulsion, was reduced to 230, which gives a piston speed of 13.3 feet per second. The mean indicated pressure has similarly been reduced from 117.8 to 102.2 pounds per square inch. With these factors each engine develops 1,650 shaft horsepower.

The reduction gears have a ratio of 2.7:1 so that the propeller makes 85 revolutions per minute. The important question of the perfect operation of reduction gears between engine and propeller was examined on a test stand, using gears of the actual size. In this connection, it became necessary to offset the negative turning moments, which occur with oil engines and are especially great in the neighborhood of the critical speed, in order to prevent excessive wear of the gear teeth. This end has been attained in the installation in question, not by the addition of separate, often unreliable, elements, but by proper proportioning of the transmission shafting and a suitable distribution of revolving masses or balance weights.

During the trial trip, by means of special apparatus, the twisting moments in the shaft, ahead and abaft the reduction gears, were measured photographically; this measurement revealed a uniformity of twisting moment in the shaft on a par with that of a turbine installation.

Savings in Weight and Space

The present installation, in comparison with a direct oil engine drive, made possible a saving in weight of 330 tons

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and in space of 6,000 cubic feet. By suitable proportioning the engine room to the size of the installation, which for certain reasons was not possible in this ship, an additional saving of 18,000 cubic feet could be made.

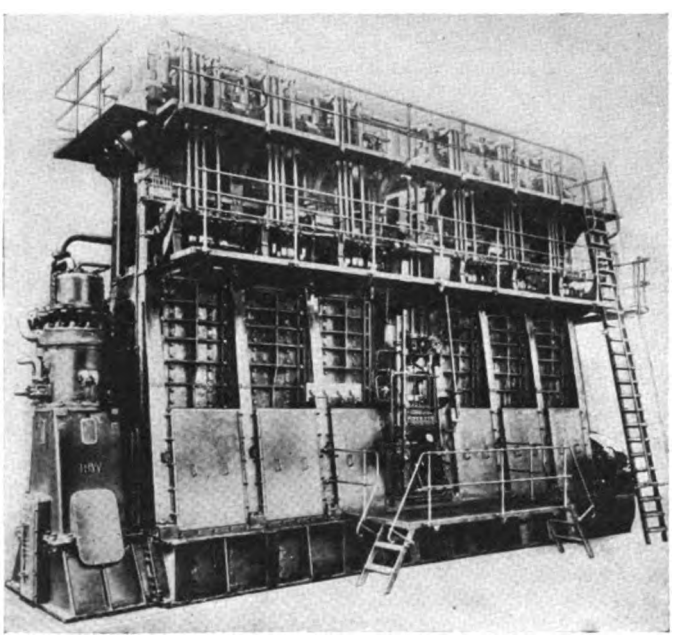
All auxiliary machinery, including the steering engine and the thirteen cargo winches, is electrically driven.

The ship made her trial trip on August 30, 1921. The reduction gears ran practically noiselessly and the fuel consumption was measured at 0.3 pound per indicated horsepower per hour. The ship has completed her first outward voyage to New Orleans. The mean indicated horsepower developed was 3,603 and the speed, with a light draft, 11 knots.

The only other instance of reduction gear being employed in connection with Diesel engines on ships is in the American motor vessel *Libby Maine* but in this case the installation was of low power, totaling scarcely 500 brake horsepower. The *Havelland,* therefore, represents an entirely new development in marine propulsion.

A Novel Diesel Engine

Another novelty in marine Diesel engine plants which has perhaps a more hopeful feature and is indeed a development of some importance is the long stroke motor, the first example



New Burmeister and Wain Long Stroke Diesel Engine for Single Screw Ship

of which has just been installed in a 4,400-ton motor vessel, the *Leise Mærsk,* built in Denmark. The engine is a new Burmeister and Wain design brought out to meet the wishes of shipowners who require single screw installations in their vessels. The chief difference is to be noted in the stroke-bore ratio which exceeds two to one, the stroke for this six cylinder 1,150 brake horsepower engine being 1,300 millimeters and the cylinder diameter 630 millimeters. The usual speed of Burmeister and Wain engines is 115 revolutions per minute but the new type operates at 85 revolutions per minute in order to provide reasonably good propeller efficiency. The construction is somewhat modified, the cylinder supports being different on account of the longer stroke, while there are certain alterations in connection with the valve gear. Apart from these points, however, the design is similar to that of the normal Burmeister and Wain engine and, as might be anticipated, the weight per brake horsepower is greater than that of the higher speed type. The 1,150 brake horsepower long-stroke engine weighs 330 tons, including all the stern gear but excluding the auxiliaries. It must be admitted that this figure is somewhat disappointing in view of the fact that a steam plant inclusive of boilers is practically of the same weight. Engines of this long stroke design are now being built in Great Britain by Harland and Wolff for installation in British single screw motor vessels, which, when completed will give an opportunity for further comparison.

A 20,000-Ton Motorship

Many projects are afoot in England for the construction of large motor passenger liners and there is little doubt that, as soon as trade conditions warrant, vessels of this class will be ordered. The Cunard Line is considering the question of building a 20-knot twin screw Atlantic liner, necessitating the employment of two 12,000 brake horsepower engines which one firm at least is willing to build without any further delay.

Another order which will be definitely placed in the near future is for a remarkable vessel of 20,000 tons gross, in which triple screw Diesel machinery is to be installed. This is to be an exhibition trade vessel specially designed to accommodate exhibits on large stands of 300 different firms, besides which cabins will be provided for an equal number of passengers. Construction will be commenced early in 1922 at the yard of Swan, Hunter and Wigham Richardson, who built the *Mauretania,* and the vessel will sail on her maiden voyage in August, 1923. It is the intention to visit most of the leading overseas ports and the tour will last some eighteen months. The new ship will be 550 feet in length over all with a beam of 75 feet. With her gross tonnage of 20,000 she will be easily the largest motor vessel that has yet been built. High speed is not required, as in a liner, and 13½ knots will be the maximum, corresponding to a machinery installation of about 9,000 horsepower. Three engines of about 3,000 horsepower each will therefore be installed and what will make this vessel still more remarkable than any other oil-engined ship is that the engines will probably be of different makes with the object of giving the machinery itself a greater exhibition value. Although no details are definitely settled it is not unlikely that one of the motors will be built by Swan, Hunter and Wigham Richardson, another by Harland and Wolff and the third by another prominent oil engine manufacturing firm. It need hardly be said that this scheme has attracted a good deal of attention. Although the idea of an exhibition ship is not new, it is stated that this is the first time that a vessel has been specially built for such a purpose.

Larger Semi Diesel Engines

A noteworthy recent development in oil engine construction is the large type of semi Diesel motor. Beardmores have just completed their first 600 brake horsepower four cylinder engine of this class for installation in a large trawler, while Vickers Petters have standardized a four cylinder 500 brake horsepower set and Bolinders are manufacturing engines of equal power. In connection with these sets it is noteworthy that many improvements have been made on the older design and in particular the employment of electric starting plugs is now almost universal. It is obviously an anachronism to have to heat up a bulb by means of a blow lamp with an unguarded flame for some 20 minutes before it is possible to run the engine. With the adoption of the electric starting plug (which consists essentially of a resistance wire wound on an insulated stud) the period required for starting can be reduced to two or three minutes or even less with the largest engines. Bolinders have, moreover, recently brought out a new injection device which they claim gives some 20 percent added power and allows the engine to run without either water injection or the use of compressed air which in the previous type was admitted to the cylinder with the fuel.

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$700,000,000 for Harbors and Terminals

By H. McL. Harding*

Every city in the United States, large or small, that has a waterfront is interested in water transportation and is earnestly preparing to have terminals as soon as possible. This is a universal movement in every section of the country. Estimates have been made as to the total amount to be invested in this work, and it is found that the grand total amounts to at least $700,000,000. Herein lies one of the greatest fields for commercial opportunities, not only for the immediate present but also for a continuing future. Details of some of the outstanding projects, either under way or contemplated, are outlined in this article.

ONE of the authorities on finance recently said "The surplus money of the country is being invested in water transportation." Half of this investment was for the carriers of the waterborne freight, the other half is now being expended for the all essential ocean and river and harbor terminals. If the land, the approaches for the drayways and railways for these terminals are included, the present investment would be more than half.

To confirm this by definite figures there is presented in the following a list of some of the ports of the United States and Canada, and the authorized anticipated expenditures with the types of terminal improvements and the varied products which will be purchased to provide the necessary work, facilities and equipment. From a comparison between the total waterfront of the different cities and the sections partially improved there can be deduced what will be needed in preparing for future equipment. Such preparation generally requires a year or more to secure the land, make designs and plans and start construction.

The yearly increase in commerce is often the guide which is followed as to extensions. The approximate average of possible freight transference per linear foot per year may be taken as 50,000 cubic feet where there is installed the latest mechanical appliances, otherwise it will not be one-third of this volume.

From the above data and knowing the probable yearly increase in commerce the required frontage to be equipped in future periods can be readily approximated. With the usual physical conditions the cost of the substructures will be about $130 per linear foot. The sums stated in connection with the various ports refer to the work to be done, contemplated or under consideration by the Federal Government, the states, cities, navigation districts, transportation companies, private companies or individuals. Later this list will be greatly extended in scope and detail.

Projects Involved in Terminal Construction

These works embrace harbor construction as breakwaters, moles, dredging, aids to navigation, shore works and facilities including piers, quays, substructures and superstructures. The superstructures require many steel or concrete sheds, numerous warehouses, machine shops and repair shop buildings, office and other structures, as cold storage, also yards, tracks and switches, roadways and often bridges.

The transit shed specifications call for structural steel, rods and bars, floors, roofing, corrugated iron, or concrete, doors, windows, sashes, skylights, tiles, sanitary appliances, plumbing, toilets, water and sewer pipes, valves, meters, sprinkler systems, ladders, switchboards, wiring and paints.

For the warehouses are specified all the materials which form part of such structures, as cement, steel, windows, stairways (steel), roofs, skylights, shutters or wire glass, elevators, chutes, doors (outer and fire), paving, platforms, hoists, piping and plumbing, furnaces, radiators, steel cargo racks, motors, paint, trucks, tiering machines and conveyors.

*Consulting Terminal Engineer, New York.

Much of the work is done by contractors. There are also fuel oil tanks, coal bunkers and grain elevators. Many articles and much of the same material as above would be required for the building of the cold storage plants, repair and machine shops and power plants.

Mechanical Appliances Essential for Operation

Mechanical appliances are essential for the operation of terminals. These comprise gantry and shop cranes of several types, monorails, hoists (fixed and travelling), winches, conveyors (belt and slat types), tiering machinery, hand and power trucks, cargo slings, hooks and nets, ropes and blocks, grab buckets and skips, electric power, wire, switchboards, motors, capstans, locomotives, tractors and trailers, electric charging plants and storage batteries, coal handling machinery, oil and water pumps, containers and scales, wireless apparatus, water and fire hose and tanks with hydrants.

In addition to the terminals themselves, there will be highways, railway storage and other yards; and for long distance transport—motor trucks, and drays, automobiles and garages. Many features connected with terminals are not included in the following figures, although they are contributory to the port development. There may, however, be included dredging plants, sheerlegs, floating derricks, floating cranes, ore and coal barges, fixed derricking hoists of large capacity, tugs, launches, boats, anchors, coaling vessels, coaling elevators, lighters, car floats and fireboats.

Contracts Let by Port Authorities

Orders for the above material and contracts for work are generally given by the port authorities. These officials are interested chiefly in ports, terminals, ships and shipping, and rely almost entirely on marine information, as to where they can purchase and who can supply port facilities and machinery. There should therefore be discussion as to the merits of such products in the papers read by the port authorities.

From times past, the ports of the world have progressed by continual steps, keeping pace with the demands of foreign and domestic commerce, a continuous market. A port with a growing waterborne traffic of miscellaneous goods, having provided correctly designed terminal works and facilities, quickly increases in wealth, population and general prosperity. To this there has been no exception. In addition to the above, the investment in terminals yields an interest return.

Some of the ports of the United States and Canada have been selected to show what are the amounts necessary for the projected or contemplated port improvements for which material or manufactures will be needed, both for initial development and for future extensions. In connection with such ports will be given the sums appropriated or necessary to carry out the contemplated plans.

Most of these ports during the normal times before the war had a waterborne commerce of over 1,000,000 tons and of $30,000,000 in value. Since then these have been of greater tonnage and values. Other smaller ports are added to the list as these are preparing for important improvements.

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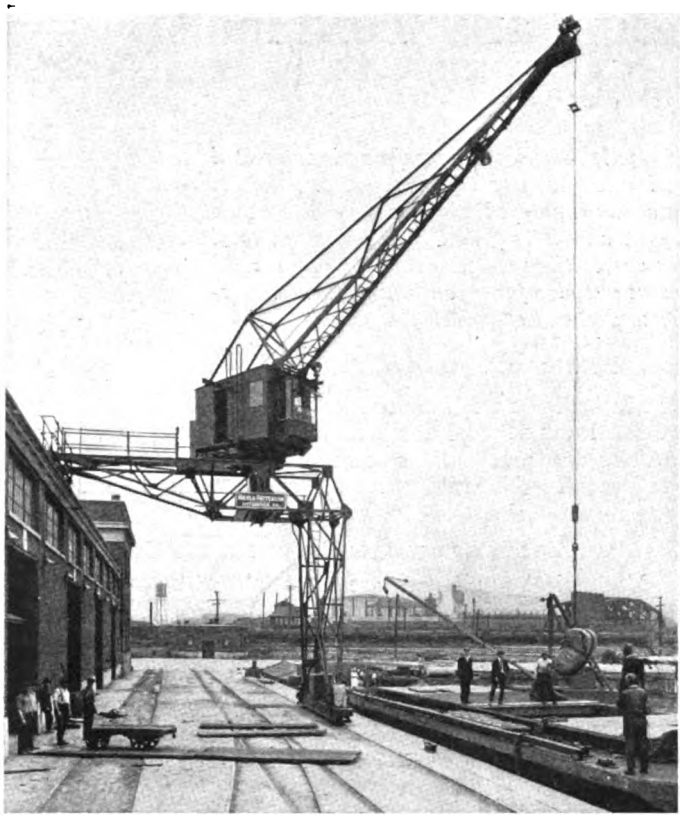


Half Gantry, Revolving Jib Crane

Attention is first called to the sums already invested in foreign ports and the appropriations for immediate extensions, as shown by the following figures:

Expenditures for Improvement of Foreign Ports

	Expended	*Extensions*
London, England	$200,000,000	$70,000,000
Liverpool, England	125,000,000	45,000,000
Manchester, England	100,000,000	20,000,000
Hamburg, Germany	100,000,000	25,000,000
Antwerp, Belgium	.....	50,000,000
Marseilles, France	.....	25,000,000
Rotterdam, Holland	.....	25,000,000
Melbourne, Australia	.....	30,000,000

FOREIGN PORT EXTENSIONS

It is stated from the latest reports of the world's port authorities that every leading port of Europe is preparing to expend from $30,000,000 to $100,000,000 in the near future.

From an examination of various reports and advance information, the following figures may be said to represent approximately the appropriations or sums proposed, or in process of being expended, or for contemplated construction by harbor authorities, transportation companies or private corporations. There is also included money requested from the Federal Government, the states, cities and navigation districts which will eventually be used for harbors, ports and water terminals. The figures as given will show the magnitude and possibility of port development in the United States and Canada. From the raw material of the past, the exports are gradually changing to manufactured products.

ATLANTIC PORT DEVELOPMENTS

New York, N. Y.—This is probably the leading port of the world. There are here many projects in contemplation which, if carried out, would require over $150,000,000. At Staten Island, along the Hudson River, at the Gowanus Bay Terminal and along the East River, the present construction will cost about $50,000,000. The Cunard Steamship Company, at Weehawken, the Luckenbach Steamship Company and other interests are building or preparing to build terminals which represent over $60,000,000. Up the Hudson River, land has been purchased at Yonkers for terminals which when built will represent an investment of several millions. There will finally be about 100 terminals along the Barge Canal at various points. There has been completed or in process of construction in New York State barge terminals representing over $25,000,000 in cost. The length of the waterfront of New York City is about 578 miles. The port district includes nearly 900 miles. The following amounts may be expended at once or in the future at the following locations in the New York district: Jamaica Bay, $7,500,000; Newark, N. J., $10,000,000; the Bronx, $500,000. At Jersey City, N. J., the Lehigh Valley railroad is building three piers, each 7,500 feet long, with extensive warehouse and freight handling facilities.

Philadelphia, Pa.—Philadelphia has appropriated $4,000,000 more for its port in addition to the millions already invested. The total length of its direct waterfront is 37.21 miles of which about 17 miles are in actual use. Over 20 miles more can be economically developed, representing a probable future expenditure, including superstructures, of not less than $80,000,000 not including land values.

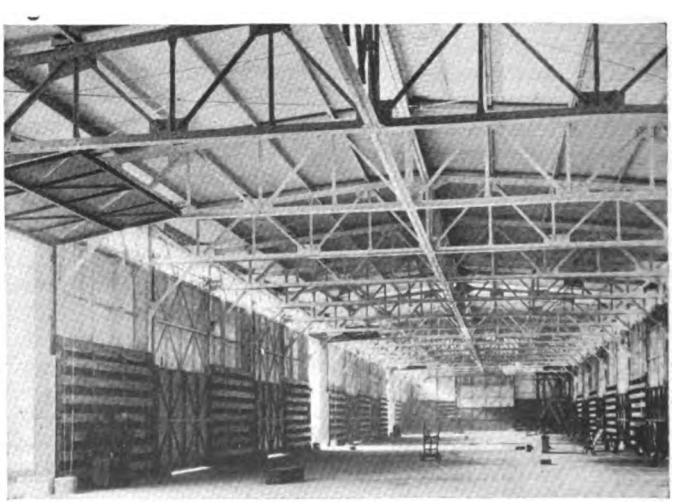
Boston, Mass.—Beside the great sums expended by the French Government, Boston and the State of Massachusetts have invested more than $9,000,000 and will greatly add to this figure by several millions of dollars. The extent of the waterfront is 141 miles. There is a linear frontage of more than 8 miles on a depth of 30 feet at mean low water.

Baltimore, Md.—These has been appropriated for the port of Baltimore $50,000,000 to be utilized for improvements from time to time as directed. The commerce of this port before the war, during normal times, was over 14,000,000 tons yearly valued at more than $439,000,000. The jurisdiction of Baltimore covers 127 miles of deep water frontage of which 43 miles have been improved.

Norfolk, Va.—The appropriation for the improvement of the waterfront of Norfolk is stated to be $5,000,000. The available water frontage is 26 miles. Norfolk is destined to be one of the greatest ports of the United States and the yearly investment will, of necessity, be large.

Wilmington, Del.—The appropriation of $4,000,000 by this city will cover only the investment as per the new plans along the Christiania River. There are 45,600 feet of waterfront available at this port, but only 15,000 feet are in service. The 30,000 additional feet can be readily brought into actual use.

New Haven, Conn.—Here immediate important terminal improvements are contemplated to cost about $1,500,000. Plans and designs have been prepared for the 7 miles of waterfront which will represent an investment during future years of over $20,000,000.



Interior of Pier Shed

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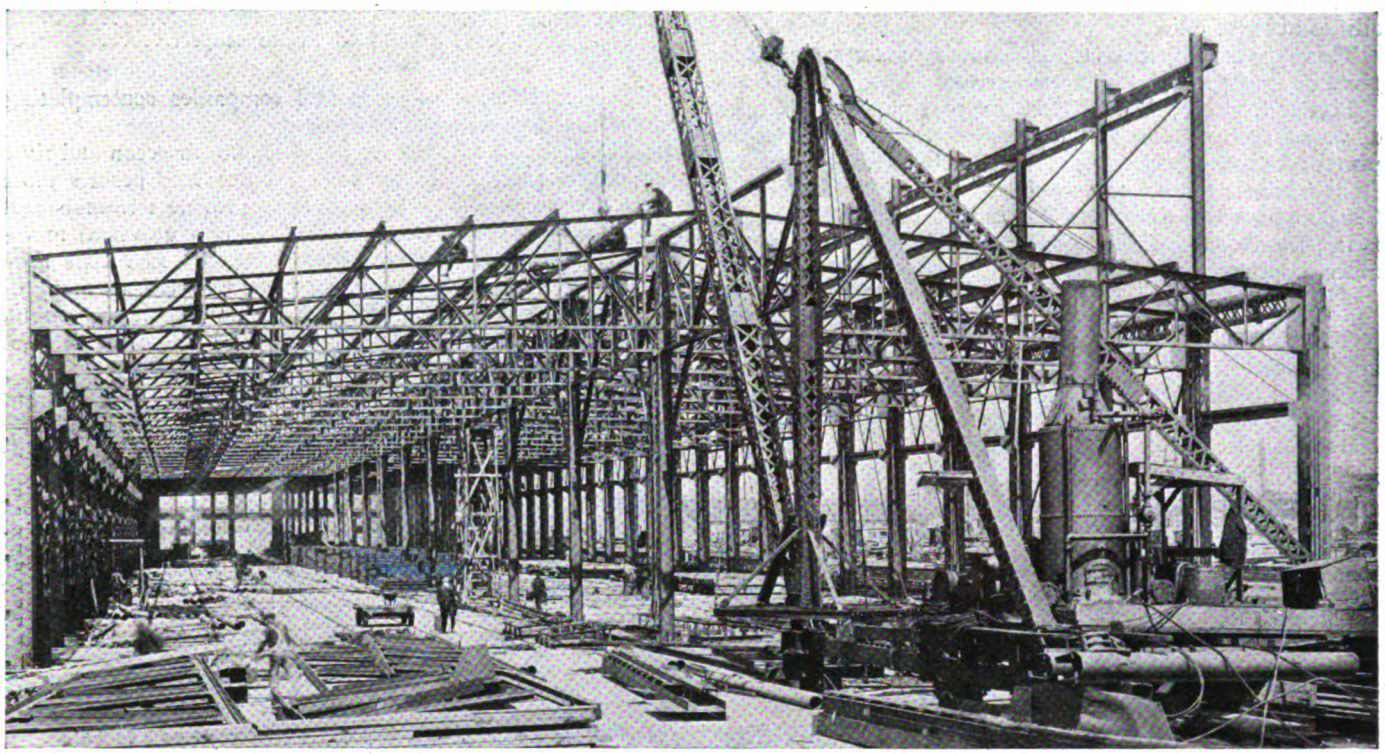

Terminal Shed in Process of Construction, Showing Structural Features

Portland, Me.—This principal city of the State of Maine is now constructing a state and municipal pier to cost about $1,250,000. The total waterfront of the three parts into which the harbor is divided is about 8 miles. There will be a continuous development from year to year through more than one generation and the total will aggregate many millions.

Providence, R. I.—This city, which has a state pier and a municipal quay, will provide $1,500,000 for future additions. The waterfront has a length of 28,000 feet of which only one half is in active use. There will be required many mechanical appliances on the present and future quays and piers such as gantry jib cranes, conveyors, hoists and motor trucks.

New Bedford, Mass.—New Bedford has a million dollar pier. The waterfront is 36,800 feet in length. With $100,000 a portion of the waterfront will be improved.

Bridgeport, Conn.—In all probability there will be appropriated by the State of Connecticut about $1,250,000 for this port. Preliminary plans have been prepared. There are here but few permanent public port terminals.

Charleston, S. C.—The total waterfront within the city limits and contiguous is about 15 miles. At this city, during the war, there were constructed by the Federal Government buildings and wharves to the value of $18,000,000. It is expected that the city will at once authorize bonds to the amount of $1,000,000 for permanent port improvements.

Jacksonville, Fla.—This city will add $1,000,000 to its previous investment in port improvements and bonds are authorized. The waterfront is 5 miles in length. Its normal commerce was 2,562,000 tons of a value of $71,244,000.

TERMINAL PROJECTS AT THE GULF PORTS

New Orleans, La.—At this, the greatest Gulf city, it is expected that for the canal, quays and structures there will be appropriated about $11,000,000. The total waterfront is 41.5 miles, not including the canal. About 6 miles have been improved.

Mobile, Ala.—There is no doubt as to the future of Mobile, and that it is now a great Gulf port. It is the port of Alabama. It is now preparing to purchase more of its waterfront. There is available for immediate use $500,000 for terminals and there are 8 miles, of which only 4 miles have been improved. About $10,000,000 will be finally expended by the state following the present policy of port expansion.

Galveston, Tex.—At this Gulf city, there will be invested $1,515,000 in the near future. The linear frontage is only 2.5 miles but with the slips included it is 5.9 miles. The adjoining port of Texas City will supplement that of Galveston in a few years.

Houston, Tex.—Houston is making provisions to improve its port and channels from a fund of $1,250,000. The waterfront is about 10,000 feet in length.

Beaumont, Tex.—Beaumont has a bond issue of $500,000 for its port. Three units have been constructed and are equipped with gantry jib cranes and overhead travelling hoists. The port has been earning about 20 percent on the money invested by the city in its terminals. Beaumont is destined to be a great port of Texas.

Pensacola, Fla.—Pensacola has a bond issue of $400,000 which it will now use in waterfront improving. The length of the waterfront is 15,600 feet.

Tampa, Fla.—Tampa is most active in its interest in waterfront commerce and has $1,000,000 to spend. At the city, including slips, the waterfrontage is about 5½ miles.

NEW MARINE TERMINALS ON THE GREAT LAKES

Chicago, Ill.—Besides the millions to be spent at the Chicago waterfront, the estimates for the Calumet and Illiana and South Chicago harbors and terminals, may approximate $58,000,000. This would be spread over the time of several generations.

Milwaukee, Wis.—To complete the terminals in accordance with the new plans already prepared, Milwaukee will require over $25,000,000, but this will be extended over not less than twenty years for completion.

The estimate for the canal and terminals on the canal between Lake Erie and the Ohio river is $60,000,000.

PACIFIC COAST PORTS

From the extent of the waterfronts of the different cities most of which will finally be improved as port terminals,

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there can be determined what will be the commercial possibilities at these cities.

This is especially true at the following enterprising cities given as examples:

Portland, Oregon, $15,000,000 for port purposes, 22 miles of waterfront available as terminals of which 5 miles is improved; San Francisco, Cal., $8,000,000 available, waterfront 8 miles, with 5 miles improved; Seattle, Wash., $6,000,000 possible, waterfront 120 miles, improved about 10 miles; Los Angeles, Cal., $4,800,000 available, waterfront 20 miles, improved as terminals 6 miles.

EXPENDITURES AT SMALLER PORTS

The following additional figures indicate briefly the amounts which may be expended at once or in the future at the following locations:

Miami, Fla.	$400,000	Lake Charles, La., dredging	2,750,000
Marshfield, Ore.	250,000	Corpus Christi, Texas	100,000
Dubuque, Iowa	100,000	Aberdeen, Wash.	140,000
Trenton, N. J.	100,000	St. Louis, Mo.	500,000
Canton, Ohio	200,000	Orange, Texas	250,000
Memphis, Tenn.	500,000	Rochester, N. Y.	490,000
Vicksburg, Miss.	500,000	Vancouver, Canada	3,000,000
Venice, Cal.	1,000,000	Toronto, Canada	13,000,000
Helena, Ark.	150,000	Montreal, Canada	2,000,000
Nashville, Tenn.	300,000	Quebec, Canada	1,000,000
Indiana Breakwater	4,000,000	Parkesburg, W. Va.	250,000
Welland Canal, Canada	8,000,000	Victoria	4,000,000
Columbia, S. C., canal	5,000,000	Esquimalt	1,300,000
		Prince Rupert	100,000

The complete list of cities and companies contemplating waterfront improvements is too great to be here given. The War Department will ask for $45,000,000 for ocean and river port improvements. Many other inland cities besides those given are proposing by themselves to provide terminals and are voting money for this purpose. It is a universal movement in every section of the United States. Estimates have been made as to the total amount to be invested, as many of the figures from small towns are not obtainable at present, but will be later. The grand total is estimated to be about $700,000,000.

It may, in conclusion, be stated that every city large or small having a waterfront is interested in water transportation and is earnestly preparing to have terminals as soon as possible. Not only is there great enthusiasm at the ocean ports, but along the inland waterways there is even a greater determination to participate in domestic and foreign commerce through inland navigation by river barges and correctly designed and equipped terminals. The number of the inland and ocean terminals for which provisions should be made may be said to be over ten thousand.

Broadening the Use of Welding in Shipbuilding*

By F. B. Webster

While there has been a rapid growth in the use of welding on the non-structural members of vessels building in the shipyards and a still more rapid growth of its use in repair work, the ambitions of the sponsors of this method of fastening metal parts together will not be satisfied until the practically rivetless ship is the rule rather than the exception. Before this goal can be reached, however, there are many obstacles to be overcome and among these difficulties none is greater than the present method of ship construction which is designed for riveted rather than welded connections.

NO more outstanding feature has occurred in the development of shipbuilding during the past few years than the growth of the use of electric, gas and Thermit welding and gas cutting. Welding and cutting have made it possible to do things that could have been accomplished in no other way and in this field they are fully entrenched and bound to develop still further. Welding of the non-structural parts of a ship has many advantages over riveting and has secured the approval of the classification societies, although the extent to which it is used varies with the practice in various shipyards. Welding of the strength members, however, presents the greatest field for development and, although the Navy Department and the classification societies have not as yet given their approval for this class of work, except as an experiment or with experimental notations, the significant fact remains that a welded joint can be made that will exceed in tensile strength or bending toughness any that can be made by riveting.

The comparative efficiencies of riveted and welded joints as determined by Sir Wescott Abell from extensive tests conducted under his direction in 1918 by Lloyd's Register of Shipping are as follows: For a treble riveted overlap, between 65 and 70 percent of the unperforated plate, for the case of welded overlaps, between 70 and 80 percent and for butt welded joints between 90 and 95 percent. These figures, of course, refer to the tensile strength, but, as is well known, the stress at which a material will break down depends largely upon whether this stress is applied steadily or by repetition. In the case of a ship this is particularly important because the strength members are alternately called upon to withstand stresses varying from maximum tension to maximum compression as the vessel passes from the trough to the crest of a wave. In addition to this the direction and intensity of the stresses on a ship vary greatly with the position of the machinery and the amount of cargo in the holds.

With full knowledge of the importance of considering the stresses occurring in actual practice which cannot be reproduced exactly and having in mind the difficulty of testing the workmanship and material in a welded joint Sir Wescott, in addition to determining the tensile strength of welded joints, included in his experiments several different methods of obtaining the modulus of elasticity, the elastic limit of the welding and welded material and other information relating to the ultimate strength and elongation of the welded joints. He also included alternating stress tests under varying conditions and a series of minor tests which included bending and impact. And, in order to ascertain the changes in chemical composition and crystalline structure which occur during the process of welding, complete chemical and microscopic analyses of both the welding and welded material were made.

Although the results of these tests have been fully described in a lecture entitled "Electric Welding for Shipbuilding Purposes" delivered by Sir Wescott before the North East Coast Institution of Engineers and Shipbuilders on November 8, 1918, it is believed that a brief outline of the facts established are necessary as a foundation for a clear discussion of the possibilities of welding from a shipbuilding point of view.

MODULUS OF ELASTICITY AND ELASTIC LIMIT

These tests were conducted on specimens of the maximum size that could be tested in a 300-ton testing machine. Special

*Paper read before the American Welding Society, October 19, 1921.

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attention was paid to securing a uniform pull across the breadth of the plate. The loads were increased by gradual increments and careful measurements were made both at the weld and at various points on the solid plate. The results of these tests, as might be expected, showed that there is little or no difference between the modulus of elasticity of the weld and that of the plating. In fact, the readings taken at various points on the plate were generally greater than those taken in way of the weld.

ULTIMATE STRENGTH

The tests for ultimate strength were also performed on as large specimens as could be tested in a 300-ton machine. This series was included in tests on the ordinary form of overlapped riveted joint for comparative purposes. The results are given in the following table:

STRENGTH OF LARGE JOINTS

TREBLE RIVETED LAP JOINTS

Thickness, Inches	Diameter of Rivet, Inches	Breaking Stress, Unperforated Plate, Tons Per Square Inch	Strength of Plain Plate, Tons Per Square Inch	Percentage Strength of Joint
.49	7/8	18.9	27.4	69.0
.53	3/4	17.1	27.4	62.5

LAP WELD—FULL FILLET—BOTH EDGES

Thickness, Inches	Total Sectional Area, Square Inches	Breaking Stress, Tons Per Square Inch	Strength of Plain Plate, Tons Per Square Inch	Percentage Strength of Joint
.24	6.24	22.4	26.5	85.0
.514	10.02	20.2	28.4	71.0
.75	8.76	18.0	26.6	68.0
1.03	9.78	20.0	25.6	78.0

BUTT WELD—NOT STRAPPED

.251	7.0	25.4	26.5	96.0
.505	10.66	27.2	28.4	96.0
.76	9.88	24.4	26.6	91.5
.99	9.90	23.8	25.6	93.0

ALTERNATING STRESSES

Two series of tests were performed in these experiments, one on round bars and the other on flat plates. The tests on flat plates were divided into four sets, viz: plain plates, butt welded plates, lap welded plates and plates with joints lap riveted. Here, as in the tensile strength tests, the welded butt joints showed the best results. These indicate that the stress which a plate with a butt weld will endure a large number of alternations is about 70 percent of a similar plain plate, while the corresponding figure for lap welds and riveted laps is about 60 percent. From these tests it was also found that welded joints would withstand a very large number of repetitions of alternating stress up to $\pm$ 6 tons per square inch from tension to compression and vice versa.

CHEMICAL ANALYSIS

Chemical analyses were made of plates, electrodes and deposited material. The observations were that the carbon, silicon and manganese were almost oxidized away from the "filling in" material during the process of welding, that the sulphur and phosphorus remained near the same and that the deposited metal was practically pure iron. It was pointed out that an increased percentage of manganese in the electrode or a coating to protect the molten electrode from oxidization would lessen trouble from this cause.

MICROGRAPHIC EXAMINATION

From a series of microphotos that were prepared to show the junction of the original and deposited metal and also the changes that took place in the structural steel, it was proved that an excellent junction could be made by an experienced workman. Incidentally, it was found that the heat of the welding did not penetrate farther below the surface than 1-16 inch.

From the foregoing it is seen that the tensile strength of welded joints is greater than that of riveted joints. It is also shown that a plate with a welded joint acts as a homogeneous unit at least up to the elastic limit. In the case of alternating stresses it was proved that welded material will withstand a large number of alternations up to a stress of $\pm$ 6 tons per square inch which is sufficient for vessels up to at least 300 feet and probably good for larger vessels. In larger vessels the calculated stresses often exceed 6 tons, but in actual experience the available information indicates that the real stresses are materially less than those calculated under the conventionally assumed conditions.

COST

With these points in view a material question would be what are the comparative costs of welding and riveting? These, of course, will vary with the type of work under consideration, but, for example, take the attachment of hand rail stanchions to deck plating, which I will quote from a paper presented by H. Jasper Cox at the 1918 convention of the Society of Naval Architects and Marine Engineers:

"1. The positions of the stanchions are lined off and the holes in the base palm marked on the deck plating by the pipe fitters.
"2. The two or three holes, as the case may be, are drilled.
"3. Interior scaffolding is erected by the carpenter at the under side of the deck for the riveters' holder-up.
"4. The stanchion is put in place, packing inserted and bolted up.
"5. Reaming is sometimes necessary.
"6. Two or three rivets have to be driven for each stanchion by a gang, which in most cases cannot be spared from the straight-away work on the decks, shell, etc.

"If electric welding is substituted, the stanchions with their rails inserted are erected in large sections and are welded directly to the deck plating by the operator, who proceeds single-handed with his electric cable from stanchion to stanchion. The watertightness or oil-tightness of the deck is not affected, and the efficiency of the attachment itself can readily be tested by blows from a sledge-hammer.

"The saving in labor by welding some of the parts in the above list will average more than 60 percent."

In connection with the cost of joining plating it is obvious that there is a considerable saving in marking off, punching, reaming and countersinking, in addition to the fact that a joint requires only one man to weld as compared with four men to rivet.

THE AMERICAN BUREAU OF SHIPPING

Before taking up what the writer considers the vital matter which is retarding the broadening of the use of welding in ship construction, it is considered only just to state that the American Bureau of Shipping, our own classification society, has always been prepared to consider on its merits and individual conditions any welding proposition that might be suggested by shipbuilding or repair yards, but to eliminate the difficulty of submitting every little job for the Bureau's approval before execution the Bureau has prepared a list specifying the parts of vessels on which electric or gas welding may be employed subject to satisfactory tests in the presence of a Bureau surveyor which are as follows:

Deck rail stanchions to plating.
Clips for detachable rail stanchions.
Continuous railing rods (joints).
Attaching deck collars (L rings) around ventilators.
Attaching deck collars around smokestack.
Attaching cape rings on smokestacks, pipes, etc.
Attaching galley fixtures to plating.
Attaching bath and other fixtures in officers' quarters.
Attaching cowl supporting rings to ventilators.
Bulwark rail top splicing and end fitting.
Skylight over galley.
Ladders and grating in engine and boiler room and attaching same to plating.
Grab rods to casing.
All stairs and ladders, including rail attachments.
Door frames to casing, hinges, latches, hooks, etc.

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Clips for attaching interior wood finish to casing.
Entire screen bulkhead.
Coal chutes.
Butts of water-tight and oil-tight bounding bars on bulkheads or floors in double bottom.
Ventilator cowls.
Stacks and uptakes.
Bulkheads that are not structural parts of the ship, such as partition bulkheads in accommodation spaces.
Framing and supports for engine and boiler room flooring or gratings.
Cargo batten cleats.
Tanks that are not structural parts.
Shaft alley escapes.
Steel skylights over accommodation spaces.
Engine room skylights.
Grab rods on exterior and interior of deck houses.
Deck houses not covering unprotected openings through weather decks.
Reinforcing and protecting angles around manholes.
Joints of water-tight angle collars at frames in way of water-tight flats.
Joints of deck collars, reinforcing and protecting angles, water-tight angle collars at frames in way of water-tight flats, etc., and all other welds which cannot be tested satisfactorily after installation are to be welded and tested prior to installation.

However, if welding is proposed on any other part of a vessel than specified above such proposal must be submitted for the Bureau's special consideration and approval in every case. The American Bureau of Shipping, before permitting electric welding of any kind, will always investigate the facilities of the welding plant both as to the capacity and methods employed and also the skill and thoroughness of the man on the job.

The Bureau has a list of the welding plants which have exhibited their facilities and their products for the approval of the Bureau and certificates have been issued to those plants which have proved themselves capable of meeting the Bureau's requirements in their particular line of work. Upon application for such certification the Bureau will send a surveyor to inspect the plant and upon his favorable report a certificate is issued.

THERMIT WELDING

With regard to Thermit welding, the American Bureau of Shipping issued instructions to its surveyors in March, 1920, to the effect that subject to the conditions outlined below the Bureau would be prepared to accept Thermit welding of heavy ship parts such as anchors, keels, stern frames, stern posts, gudgeons, rudder posts, stems, propellers, etc. This permission, however, is subject to a complete report before the welding is undertaken containing such information as the name of the ship, a full description including sketch of the part to be repaired, name of welding contractor, manufacturer of Thermit mixture, apparatus, etc.

A Bureau surveyor will supervise the welding operation. He should make certain that ample time is allowed for the weld to solidify and, when cooled, subjected to the following test: Where the collar of the weld is not to be removed a groove should be gouged in the same by a pneumatic chipping hammer and, if on examination of the groove no defects are seen, the weld may be considered sound. When the collar on a weld is machined off it can be judged by the machined surface. In structural work the Thermit weld has proved itself sufficiently satisfactory to warrant the approval experimentally of a new stern frame built up of small forgings joined by Thermit on condition that each forging be tested according to requirements of the rules and that the finished frame be dropped bodily from a height of 10 feet on a hard surface without showing signs of weakness.

WHY DEVELOPMENT OF SHIP WELDING IS RETARDED

Notwithstanding the advantages and merits of welding, this art has not been adopted in shipbuilding to anywhere near the extent hoped for by its advocates. To some extent this is undoubtedly due to the fact that the executives in a shipyard are more or less influenced by the men who do the work and these men are more or less uninformed about welding or prejudiced in favor of the old methods. The shipowners are also very conservative when it comes to trying anything new which in their judgment might affect the safety of a ship at sea.

The real cause, however, that is delaying the adoption of welding in the strength members of a ship lies in the present method of design. The modern ship with its angle bars and other shapes is designed for riveting and the faying surface of most of the flanges of these bars serve no other purpose than to provide a means of riveted connection. With riveting a calking edge is of course necessary and the toes of the bars often serve for this purpose, but in welding the calking as well as the connection is in the weld. Before the art of rolling shapes was discovered ships were entirely constructed of plates and flat bars and the flat bars

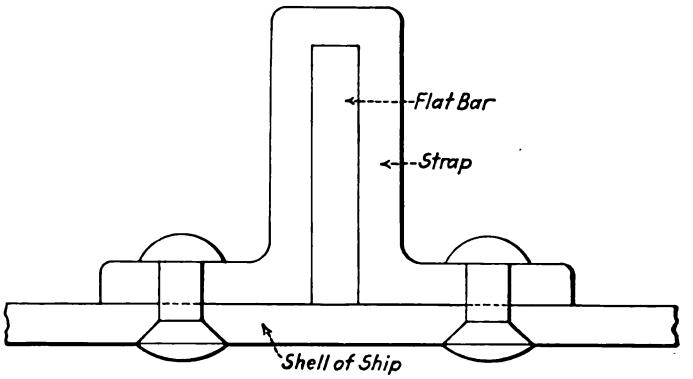

Fig. 1.—Section Showing Method of Fastening Flat Bar Frames to Shell Which Was Used Before the Art of Rolling Shapes Was Discovered

were held in place perpendicular to the plating by straps spaced at frequent intervals as shown in Fig. 1.

If the strap is removed and the junction of the bar and the plate welded we have a section that is as strong as an angle bar plate connection with a more symmetrical neutral axis. Where something stronger than a flat bar and plate section is required the toe of the web of a tee bar or flanged plate or the toe of the flange of an angle bar may be welded to the plate. This is but one indication of a type of efficient welding construction, but its importance is obvious when the amount of weight that can be saved by the omission of faying flanges, and also the beveling of these flanges in the curved portions of the ship, is taken into consideration.

Another custom and prejudice to be overcome is the overlapped and the strapped joint. We have seen from the tests described above that the butt joint is the strongest both for tensile strength and alternating stresses, but in spite of this Lloyd's requires the lap joint. The lap joint is not only

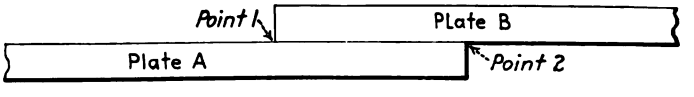

Fig. 2.—Section of Lap Joint in Shell

weaker but, as shown in Fig. 2, it is a positive menace; for any movement in plate A causes that member to act as a lever about point 1 as a fulcrum tending to cause a weakness or rupture at point 2.

Where there is such a difference in the means of fastening as exists between welding and riveting it is but natural to expect that the method of construction for one type is not suitable for the other. And, in spite of the fact that the

(*Concluded on page* 856)

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What the Shipping Board Is Doing

Reduction of Expenses—Separation from the Fleet Corporation — Bare Boat Charter Plan — Egyptian Cotton Traffic

CHAIRMAN LASKER of the Shipping Board has announced that on September 15 the number of its employees had been cut to 6,358 and the annual payroll to $12,952,000, as compared with 8,324 employees on June 15 with a total payroll of $15,893,000. These reductions were effected in about half of the departments and further reductions will be made.

Chairman Lasker announced September 17 that the board lost in July $5,700,000 in operations on voyages terminated. Actual cash payments in the month, including payments on past debts, amounted to $9,300,000. In the last year the losses of the board have been estimated at from $10,000,000 to $12,000,000 a month.

The board is endeavoring to get its monthly operating loss down to $5,000,000, Chairman Lasker said. If the board can accomplish that, it was said, it would be doing about as well as possible in the face of the depression in ocean shipping. With the revival of business and complete enforcement of the provisions of the Jones act, however, Chairman Lasker believes that the board would be able to wipe out its operating loss completely. He said the board for the fiscal year beginning July 1, 1922, hoped to keep within an appropriation of $50,000,000 and that the end of large appropriations for the board was in sight.

The following letter to Charles G. Dawes, director of the budget, was made public by Mr. Lasker:

"Confirming our telephone conversation of today, of course, we will have to arrange to keep within the President's commitment of $100,000,000 for the Shipping Board for the present fiscal year.

"We have so far been given $48,500,000 for operations and $25,000,000 for construction, making a total of $73,500,000. It is possible that we will need $6,000,000 or more additional for the vessels now being completed (these vessels being the last of the ships to be constructed for the government). However, if it is decided to recondition the *Leviathan* we will need $8,000,000 to $10,000,000 for that purpose.

"Even though we keep within the $100,000,000 for the year, we will have to go to Congress for an additional appropriation of $26,500,000, having received thus far appropriations of $73,500,000, as accounted for above. The $26,500,000 will be needed to complete vessels now being constructed and to pay losses of operations. We have made a budget of $100,000,000 and are curtailing our operations accordingly.

"However, we wish to call to your attention that we have large receivables and assets which we took over from the prior Shipping Board. We are hoping to collect therefrom $20,000,000. If we are successful in that, we will be able to pay claims up to the amount of the collections, providing Congress votes us the rest of the $100,000,000, and further, providing Congress lifts the ban on our paying claims. But, if Congress does not vote us the balance of the $100,000,000, we will need all the money we can get from collections to operate even on a curtailed basis, and should it be decided to recondition the *Leviathan*, we will not only need the $100,000,000 from Congress but we will need a great share of all the money we will collect to do this reconditioning, and to that extent could not settle with any claimants.

"All of this does not take into consideration the sum of $20,000,000, more or less, due by us from the days of the past to the Navy. When we give the figure of $20,000,000 as due the Navy we want to make clear that the amount involved has never been determined between the Shipping Board and Navy, and at an early date we are going to have a matching of accounts.

"We have always gone on the basis that we would not be asked by the Navy to pay this amount, and, in fact, the Navy has been very indulgent. Should the Navy require this sum for their own appropriations it will be necessary for us to go to Congress for a special appropriation, because we could not possibly operate with $100,000,000 this year and meet the old obligations to the Navy which accrued before the present board ever was brought into being.

"We want to emphasize that the Navy has been most considerate in the premises herein referred to.

"P. S.—Of course, you understand that there are admiralty claims out for $50,000,000 (which may or may not be settled and which may take only a fraction of the $50,000,000); claims and lawsuits of around $200,000,000 for which we have provided nothing in the estimates above given, save for such moneys as we may be able to spare out of the collections above referred to, if any."

Shipping Board and Fleet Corporation Separate

An important development is the recent separation of the Emergency Fleet Corporation activities from those of the Shipping Board, the Board retaining certain supervisory and veto authority over the actions of the Corporation. The members of the Shipping Board resigned as trustees of the Emergency Fleet Corporation and the chairman and vice-charman of the board resigned as president and vice-president of the corporation respectively, following the election of Messrs. Joseph W. Powell, J. B. Smull, W. J. Love, A. J. Frey, Harry Kimball, Elmer Schlesinger and E. P. Farley as trustees of the Emergency Fleet Corporation. Mr. Farley was also elected a vice-president of the Emergency Fleet Corporation. The others had previously been elected vice-presidents of the corporation.

The new board of trustees elected Joseph W. Powell president and general manager of the Emergency Fleet Corporation. T. L. Clear, formerly treasurer of the Isthmian Canal Commission, was also elected treasurer of the corporation. Col. E. A. Shepherd has been appointed comptroller, Mr. Powell serving as a "dollar a year" man.

The purpose of the members of the Shipping Board in resigning as trustees of the Emergency Fleet Corporation, and of the chairman in resigning as president, was, as expressed in the preamble of a resolution adopted by the Board, to give the Shipping Board an opportunity to function under the Merchant Marine Act, 1920, in those broad and constructive powers which must be brought into being, if we are to have an American merchant marine. The Shipping Board itself has powers over America's overseas commerce much like those exercised by the Interstate Commerce Commission over railroads.

The Emergency Fleet Corporation is possibly the largest corporation in the world, Mr. Lasker explained, and for the Shipping Board to direct it would be practically the same thing as having the members of the Interstate Commerce Commission, in addition to their present duties, act as directors of the great railroad systems of the country.

When the new Shipping Board took office it first had to survey its situation and find men of responsibility who could operate the Fleet Corporation's physical properties. It has now done so and feels that it is prepared to turn over the operation of its properties and the liquidation of its physical assets, other than ships, to the Emergency Fleet Corporation. The divorce is complete. Those having business with the Emergency Fleet Corporation will have to deal through the new board of trustees and the corporation officers, who alone will have powers over the assets and the operations of the Emergency Fleet Corporation, with the exceptions noted, though the Shipping Board retains to itself the power to veto cancelling of established lines or the allocation of passenger vessels. With these exceptions and that of ship sales the Shipping Board, as such, beginning October 1, is devoting itself entirely to a study of those sections of the Jones Act which were designed to establish an American merchant marine as a whole.

The administrative functions of the Emergency Fleet Corporation are as follows:

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(1) The operation, maintenance, repair and reconditioning of all ships owned by the United States Shipping Board, except that as to operation, no established lines will be discontinued or new lines be established or allocation of passenger vessels be made until the same shall have been confirmed by the United States Shipping Board.

(2) The completion of ships under construction and the sale of ships owned by the United States Shipping Board subject to the policy and as to terms and prices established by the United States Shipping Board.

(3) The care and sale of all surplus materials.

(4) The operation and sale of housing projects, real estate, railroad and other similar property subject to confirmation by the United States Shipping Board before any final contract of sale is made.

(5) Operation and sale of dry docks, any sale being subject to such terms and prices as may be established by the United States Shipping Board.

(6) All accounting of the United States Shipping Board and Emergency Fleet Corporation.

(7) Insurance and matters pertaining to the same.

(8) Operation of all German or War or Navy Department pier facilities as, and if, turned over to the Board, with the exception that no lease of said piers shall be executed prior to confirmation by the United States Shipping Board, and

(9) Leasing and rental of offices, warehouses, docks and storage facilities.

Bare Boat Charter Plan

The promulgation of a bare boat charter plan will not be made for several weeks, and the existing managing agency contract will be continued probably for several months, according to officials of the board. The board had recently announced that it hoped to adopt the bare boat charter plan within 30 days, but it is now said it will require at least several months to work out a new plan. The agency contract is being modified from time to time. A temporary form of bare boat charter has been worked out covering two boats assigned to the Admiral line for Pacific Coast service on the basis of a rate of 50 cents per ton month. These two boats are of 9,600 deadweight tons each. The allocation was approved by the board on September 22 as the result of negotiations with A. F. Haines, vice-president of the Pacific Steamship Company. The charterer will pay all voyage repairs and voyage expenses and the board will carry general insurance and marine insurance. Mr. Haines said the two vessels would be used for carrying grain from the Pacific Coast to Europe via the Panama Canal and that the cargoes would be the first of grain in bulk from the Pacific Coast. If the Admiral line is successful in its venture, it will establish the fact that the government vessels can be operated successfully on such a basis. Later two additional boats were chartered by the Hall-Shaw Steamship Company on the same basis.

To Fight Egyptian Cotton Traffic

The Emergency Fleet Corporation, it is understood, intends to make a vigorous fight, to the extent of cutting rates, if necessary, for participation by American steamships in the movement of Egyptian long staple cotton and other products to American ports. This decision follows the failure of negotiations which have been conducted with representatives of the British lines in England, as explained in the following statement recently given out at Washington by Vice-President W. J. Love:

"As a result of direct negotiations with the Liners' principals in England, the former offered to relinquish to American bottoms 50 percent of the direct sailings between Alexandria and the United States; stating that it was not possible for the Liners to make any arrangements with regard to the indirect traffic, that is, cotton moving to the states with transshipment at an English port, claiming that this was a matter of negotiation between American transatlantic steamers and the Atlantic Westbound Conference, the agreement to run for a period of five years.

"Our reasons for declining this offer were that:

"The offer contemplated giving us 50 percent of the sailings but did not guarantee to us 50 percent of the cotton, and, seeing that contracts were in existence between the British Conference and the cotton shippers for the season 1921-22, and further seeing that there was an insurance disability against American steamers, we were not at all satisfied that 50 percent of the sailings would in any way mean to us 50 percent of the tonnage; we being further advised that the principal owner of one of the British lines was a very large stockholder or connected through subsidiary companies with the cotton presses and gins in Alexandria; also that much of the banking necessary in connection with the movement of this valuable crop was in the hands of financial institutions affiliated with British institutions of a similar character.

"With respect to the indirect movement, the bulk of this business moves on a through rate, and seeing that a number of lines carrying this cotton from Alexandria to the United Kingdom also control lines from the United Kingdom to the United States, we felt it was hardly possible for American boats trading out of Liverpool to get anywhere near a fair proportion of this traffic.

"The five-year proposal likewise was distasteful to us for the reason that it entailed an absolute commitment on the part of the Shipping Board of a character that we felt indisposed to enter into, seeing that heretofore the negotiations for the movement of the Egyptian cotton crop as between the British Conference and the shippers were of a yearly character, simply covering a crop-year movement.

"The existing contracts entered into for the current movement as between the British Conference and the association of shippers specifically provides that no cotton shall move either direct or indirect to the United States in other than British bottoms.

"To have accepted the agreement, therefore, without a written modification of same would have placed us in a very doubtful position. This contract also provides that no Egyptian cotton shipper could sell his goods except on a C. I. F. basis. This means that the cotton is sold, laid down in a United States port, and the routing of same controlled by the shipper, who is dominated by the British Conference in Alexandria. No American consumer of Egyptian cotton, therefore, has the slightest control over the ocean carriage of same, it being reserved, as previously stated, by the shipper under the terms of his contract with the British Conference in Alexandria.

"Another point in this controversy is that according to long custom bids are put in every year by the British Conference in the Spring to the Alexandria General Produce Association for the movement of the crop year beginning the following September. The bids that were put in by the Shipping Board were materially lower than those put in by the British Conference, and yet for reasons still unexplained to us, our bids were thrown out and new bids called for from the British Liners without our knowledge, and when these second figures were submitted by the British Liners they were found to be the same as those originally submitted by us.

"In this connection, it has come to us confidentially that an agreement existed within the Alexandria General Produce Association that the business would be given to the British provided the bids of all companies were the same."

Cabinet Discusses Merchant Marine

The President and his cabinet devoted the entire cabinet meeting on October 7, which lasted for two hours, to a discussion of merchant marine affairs and it is proposed to devote another session to the same subject. No announcement was made of any conclusions reached but it is known that Chairman Lasker has recently submitted to the President at his request an exhaustive report from the Board on the Jones merchant marine act, with particular reference to sections 28 and 34, and it is presumed that this report was the subject of the meeting.

Broadening the Use of Welding in Shipbuilding

(*Concluded from page* 854)

welding used in the construction and repair of locomotives, in the repair of marine boilers and in the construction of the all-welded vessels already built has shown that this method of fastening is reliable, the use of welding in ship construction will not reach its proper development until the designs of ships are modified to suit its characteristics. Whether the future designs for the all-welded ship are along the lines indicated above or not is immaterial, but the advantages that welding possesses are sure to increase its use in the marine field and the thing most needed to hasten this development is an approved and efficient method of welded rather than riveted ship design.

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Questions and Answers for Marine Engineers

Inquiries of General Interest Regarding Marine Engineering and Shipbuilding Will Be Answered in This Department

Conducted by James L. Bates

This department is maintained for the service of practical marine engineers, draftsmen and shipbuilders. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Are Deck Fittings Weakened by Galvanizing?

Q. (1133).—(1) I would like to know if ordinary deck fittings are liable to be weakened by galvanizing? Can you quote actual tests showing that they either are or are not weakened, or can you refer me to published tests? If they are, or may be, weakened by galvanizing, can you explain the reason?

(2) What was meant by the term "screw bolts" used in some old wooden ship drawings and specifications?

(3) What are "jumped knees," a term in Lloyd's Rules for Wooden Ships?

(4) What are "furrens," same source as above?

A. (1133).—(1) Comparative tests carried out upon ¾-inch diameter bar iron intended for use in the manufacture of chain showed that galvanizing does not injure nor change in any way the physical properties of bars of this kind. In the United States destroyer practice deck fittings are frequently galvanized. This practice has successfully stood the test of hard service. The only case in which galvanizing has been considered to exert a weakening effect, so far as the writer's knowledge is concerned, is that of a welded member, such as a chain link. Actual test has indicated that galvanized chain is noticeably weaker than the same chain ungalvanized. This is believed to be due to the weakening action of the acid bath which eats out the slag along the weld line, thus reducing the area of cross section at this point.

(2) A screw bolt, according to Hammersley's "Naval Encyclopedia," is one which terminates in a screw. It is principally used for temporary fastening during construction.

(3) A jump knee is a knee, one of whose arms is terminated abruptly or cut square off short of the proper length because of interference by another member of the ship's structure. Such a shortening results in inadequate connection between the knee arm and the ship structure.

(4) The writer is unfamiliar with the term, "furren." It is suggested that this matter be taken up with Lloyd's Register of Shipping.

Problems for a Marine Engineer

Q. (1139).—(1) What taper must I give an expanding nozzle for the maximum velocity of steam? (In a certain soot blower there are many small nozzles and I am anxious to learn what taper to give them.)

(2) If I had no steam indicator and wanted to set the valves of the main engine (piston or slide) how would I figure the lead, knowing the length of steam ports and diameter of cylinder. How would the speed of the engine affect the lead?

(3) In figuring cubic feet of pipe in cold storage work, do I figure the area inside or outside of the pipe? How many feet (cubic) of pipe are required for a cubic foot of refrigerator space on shipboard, where meat is carried at a temperature of about 20 degees Fahenheit?

(4) Which side of a boiler tube do I measure for heating surface?

(5) What is the United States Steamboat Inspection Service rule for measuring the inside diameter of a corrugated furnace?

A. (1139).—(1) The most efficient angle between the divergent sides of an expanding nozzle in general is between 12 and 15 degrees, though it might be possible to go as high as 20 degrees. To exceed this angle would decrease its efficiency by too rapid expansion, setting up serious eddy currents.

(2) The writer knows no way of figuring the lead of an engine valve where only the length of the steam ports and cylinder diameters are given. The lead is a function of the valve travel and not of the cylinder diameter.

The lead is affected by the piston speed in the following manner:

The larger the cylinder the greater the weight of the moving parts, thus requiring more lead to overcome this inertia. The lead helps to cushion the piston at the ends of the stroke. In small high speed engines the overcoming of the inertia forces is not so important as the necessity of passing as large an amount of steam into the cylinder up to the point of cut-off as possible in the limited time during which the valve is open to admission. This time is increased by admitting steam slightly before the piston reaches the end of its stroke.

(3) The outside diameter of cold storage pipe is used as a basis for calculations. To insure a temperature of 20 degrees F. about 0.4 square foot of brine pipe should be allowed per each two cubic feet of refrigerating space for rooms of 1,000 cubic feet or less.

(4) The dimensions of the heating surface of a boiler tube are measured on the outside surface for both water and firetube boilers.

(5) In the United States Steamboat Inspection Service the practice is to take the least inside diameter of corrugation as that of the furnace.

Power for Towing Barges

Q. (1135).—I am planning to build several barges for use in shallow channels, averaging from 8 to 15 feet in depth. They are to be of 600 tons capacity each and about 150 feet in overall length. The beam is to be 40 feet. What power will be required to tow a single barge at a speed of six miles in still water and with what shape of ends may the best results be expected?

A. (1135).—The question as stated can only be answered in general terms because the specific requirements of the service contemplated have not been enumerated in sufficient detail to make possible a definite answer. The following information partially answers your query and should prove of assistance upon further investigation of your problem.

Seven or eight years ago exhaustive tests on towboats were carried out in the model basin at Ann Arbor, Mich., under the direction of Professor Herbert C. Sadler. The results of these tests covered the effect upon resistance of varying channel depths and different forms of hull. Of the forms tested three types gave generally the best results. All three types had 50 percent parallel middle body and rectangular cross sections in the way of same.

Type 1 in deck plan was faired in at the ends to a width of about half that amidships. In profile it was scow-ended, the cut-up at each end being straight and taking place through about one-eighth the overall length.

Type 2 was rectangular in deck plan. In profile its ends were formed by a radius equal approximately to the load draft and tangent to the bottom and to the forward and after perpendiculars.

Type 3 was given shipshape ends, the water plane coefficient varying from about 0.87 at the deep load line to 0.77 or 0.78 at the bottom plane.

The following conclusions are stated in the report, covering the above tests. Type 3 has the advantage of less re-

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sistance than either type 1 or type 2 in the majority of displacements, groupings and depths of water and is, therefore, the most economical type for general service in which all these conditions may be encountered. On the other hand, it is more expensive to build and repair and under certain conditions of service the other types offer less resistance to towing and are also more convenient to operate. If the barges are to be used through long distance commercial traffic, the saving in resistance incident to the use of type 3 will probably more than offset its higher first cost and subsequent higher cost of repairs. If, on the other hand, the traffic involves short distances and frequent breaking of tows and shifting of barges, the greater ease and convenience in making up and breaking the tows and the greater simplicity of form with resultant economy of construction and repair of Nos. 1 and 2 may be sufficient reasons for disregarding the differences in resistance to towing and under such conditions Nos. 1 and 2 might be preferable to No. 3.

For the case suggested it is assumed that the weight of the barge for any of the types without cargo may be taken as 190 tons and the displacement, loaded, 790 tons. Then the draft in the case of type 2 is about 4 feet 10 inches in fresh water. Types 1 and 3 would have drafts somewhat greater in each case than type 2.

At a speed of six miles per hour in a channel of 12 foot depth, the resistance in pounds per ton of displacement is 7.2 for type 2 and 4.4 and 4.1 for types 1 and 3, respectively. The corresponding effective horsepowers are 91, 56 and 52.

The question as stated covers only the horsepower required to tow a single barge and the powers above quoted have been derived upon this basis. In case it were desired to tow groups of several barges, the relative horsepowers required for barges of the three different types might differ considerably from the figures above given.

NEW BOOKS

THE POWERING OF SHIPS. By J. Bertram Thomas, M. B. E., A. M. Inst. C. E. Size, 6 by 9¼ inches. Pages, 320. Diagrams, 182. Tables, 90. London, 1921: Scott, Greenwood & Son. New York, 1921: D. Van Nostrand Company.

In the discussion of papers containing experimental data on the resistance of ships, read before the Institution of Naval Architects in 1919, attention was called to the difficulty of finding in the mass of available information any particular item required and to the desirability of having something done towards collating and condensing all this information into a simpler and more accessible form. As a result of this incident, the author set about to meet this need by compiling such data in the form of a book in which the experimental results are converted into the constant system of notation in general use by naval architects in Great Britain. Following a brief introductory chapter, the theory of ship resistance is presented in barest outline, followed by an explanation of Froude's constant system of notation and its practical application. The rest of the book comprises the data, conveniently arranged for rapid reference and application, compiled from the results of experiments which have taken place principally in the United States and England during the last twenty years covering the effect upon ship resistance of various modifications or variations in the hull.

CORRECTION.—In the answer to Q. (1132), published on pages 709 and 710 of the September issue, in view of the assumptions made as to the resolution of the force *F*, the observation made in the last paragraph on page 709 is in error. This paragraph should be omitted in its entirety.

LETTERS TO THE EDITOR

The First Triple Expansion Engine Built in the United States Still in Service

I wish to comment on the first of the one hundred questions which are answered in the October issue, "Who built the first triple expansion engine in this country?"

It may interest you to know that this engine, built by The Bath Iron Works, is in the steamer *Winter Harbor,* which runs from Boothbay Harbor to Wiscassit, Me. The boat makes two round trips every day in the year, Sundays excepted.

Brooklyn, N. Y. A SUBSCRIBER.

The Webb Institute of Naval Architecture

Just a little information on Question 44 by "Old Scotch" in the October issue. The institution is no longer known by that name to Webb graduates and undergraduates, as "Webb Academy" was changed to Webb Institute of Naval Architecture in July, 1920. We wish the shipbuilding world to know it as such, for the Institute has a much larger curriculum and gives its students the best shipbuilding education in the country. A junior there would make a very creditable showing on "Old Scotch's" examination.

Brooklyn, N. Y. EDWIN T. DAY.

Should Direct or Alternating Current Be Used for the Lighting Set?

I have discussed the answer to question 65, "Why should not alternating current be used for the lighting set?" as given on page 756 of the October issue of MARINE ENGINEERING AND SHIPPING AGE, with an electrical engineer who does not concur in the statement of "Old Scotch." Further discussion of this proposition in the pages of your magazine would therefore be appreciated. C. HIBBARD.

Bridgeport, Conn.

Some of the advantages of the use of direct current on board ship for lighting purposes over alternating current are as follows:

One of the most important reasons why alternating current should not be used is the fact that even 110 volts alternating current has been known to be fatal to human life. Induction makes it almost impossible to keep alternating current from becoming grounded, if used for lighting, thus making it more expensive in the cost of installation for the wiring systems.

Direct current must be used in any event for all communication systems such as telephone, bells, signals, enunciators, etc. Storage batteries for wireless must be charged by direct current. Searchlights operated on direct current are more efficient and steady than when using alternating current. Electric telemotors must use direct current.

The flexibility and control of direct current motors cannot be equaled by alternating current motors. Alternating current generators and motors are larger than direct current generator motors of the same voltage. Direct current generators must be used in connection with alternating current for the field excitation of the alternating current generator.

The almost universal use of direct current for lighting purposes on board ship is most conclusive evidence of its vast superiority to alternating current. "OLD SCOTCH."

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PERSONAL MENTION

LEOPOLD DOR, of Paris and Marseilles, has been appointed general counsel for the United States Shipping Board in France. Mr. Dor is one of the leading Admiralty counsels of France and will immediately start proceedings in demurrage cases, insurance cases and the like in the Fleet Corporation's interest.

HARRY KIMBALL has been elected vice-president of the Emergency Fleet Corporation in charge of financial matters, having jurisdiction over the treasurer's, collector's and auditor's offices. Mr. Kimball graduated from the United States Naval Academy at Annapolis in 1896 and became connected with the Boston Edison Company. In 1902 he became president of the American Zinc Lead & Smelting Company and in 1916 he was elected president of the Aetna Explosives Company. Later in the same year he became president of the Remington Arms Union Metallic Cartridge Company and after leaving this position was placed in charge of the winding up of the affairs of Gaston, Williams & Wigmore. Recently he has been engaged by the Chase National Bank and other New York banks on special reorganization work in connection with the affairs of various companies. Mr. Kimball is also a trustee of the Emergency Fleet Corporation.

Harry Kimball

REAR-ADMIRAL JOHN KEELER ROBISON, U. S. N., has been appointed by Secretary of the Navy Denby to succeed Rear-Admiral R. S. Griffin as engineer-in-chief of the United States Navy. Admiral Robison was born in Ann Arbor, Mich., November 30, 1870. He graduated from the United States Naval Academy at Annapolis in 1887, later continuing his studies in Paris at the École du Génie Maritime from which he graduated in 1894. He attained the rank of assistant engineer in 1897 and in 1899 was transferred to the line where he passed through the successive grades to his captaincy in 1916. Probably the Admiral's best known work is that of organizing the post-graduate engineering course at Annapolis in 1910. At various times before and during the war he was in charge of the development of torpedoes and conducted aeronautical experiments. After the troop movement started in 1917 he was in charge of convoys until September, 1918, when he was made chief of staff at Cardiff, Wales. He was senior member of the allied commission for taking over German merchant vessels after the armistice and also served as delegate to the peace conference at Brussels in March, 1919, as an aide on Admiral Sims' staff in London and as a representative on various European food commissions. Admiral Robison has specialized in the study of boilers and for a number of years has had much to do in shaping the Navy's policy with regard to boilers. He is also the author of the Navy's first boiler manual.

Rear-Admiral J. K. Robison

JOSEPH E. SHEEDY has been appointed European manager for the United States Shipping Board to reorganize the foreign branches. It will be Mr. Sheedy's duty to systematize the work of the department abroad and eliminate unnecessary duplication, thus effecting a reduction in the personnel. He received his early training as an officer in the Coast Guard (then the Revenue Cutter Service) and was general superintendent for some time of the Inter-Island Steam Navigation Company, Honolulu. In 1916 he became general manager of the Seattle North Pacific Shipbuilding Company. From the Seattle yard of this company he went with the Seattle Construction and Dry Dock Company as assistant to the president, later becoming manager of the Downey Shipbuilding Corporation, Staten Island, New York. While on the Atlantic coast he served as a member of the United States government committee on bulkheads and freeboard; a member of the technical committee of the American Bureau of Shipping; a member of the planning and control committee of the Atlantic Coast Shipbuilders' Association and was also connected with the council of American Shipbuilders.

Joseph E. Sheedy

CHARLES R. PAGE, according to an announcement of President J. B. Levison, has been appointed manager of the Atlantic marine department of the Fireman's Fund and the Home Fire and Marine Insurance Companies to succeed F. H. and C. R. Osborn, who have resigned as of December 31. Mr. Page entered the employ of the Marine Department of the Fireman's Fund in San Francisco twenty years ago following his graduation from Yale University and resigned in October, 1917, when he was appointed a member of the Shipping Board by President Wilson. Upon the organization of the American Marine Insurance Syndicates he became manager of Syndicate "A," now merged into the United States Salvage Association, from which position he is retiring at the end of the year. Mr. Page states that under the new arrangement the service for American vessels will be carried out as formerly and that connections abroad under the Salvage Association will be extended.

Charles R. Page

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F. J. McKIBBIN, formerly with the United States Navigation Company, is now traffic manager of the Transport and Terminal Company, 11 Broadway, New York.

JOHN F. ANDREWS, until recently manager of the traffic department of the division of operations of the Shipping Board at 45 Broadway, New York, has rejoined the staff of Norton, Lilly and Company.

H. R. PROCTOR, manager of the Egyptian offices of Messrs. Gray and Hunter, consulting engineers and naval architects, Alexandria, Egypt, has been appointed non-exclusive surveyor to the American Bureau of Shipping.

ROBERT C. LEE, who acted as general manager of the United States Lines until T. H. Rossbottom took up the duties of that position, has returned to the Moore & McCormack Company, Inc., where he will assist the receivers in straightening out the financial affairs of the old United States Mail Steamship Company, Inc.

ROBERT M. WATKINS has been appointed operating manager of the Emergency Fleet Corporation's vessels in the New York district. He was formerly marine superintendent but this department has been abolished by A. F. Mack, district manager for the Fleet Corporation, who is working out economy and efficiency plans in the personnel of the district. In six weeks by the elimination and consolidation of departments a 25 percent reduction has been accomplished and still further retrenchment will be made by the abolition of unnecessary detail.

SIDNEY HENRY, commercial manager of the United States Shipping Board Emergency Fleet Corporation, has begun the organization of a division of the board which will dispose of surplus material and property other than ships, still in the hands of the Fleet Corporation. Mr. Henry was formerly vice-president of the Baltimore Dry Docks and Shipbuilding Company. The new division will be divided into four departments: materials and sales; transportation and housing; dry docks and marine railways and plants. F. H. Walsh of New Bedford, Mass., will have charge of the material and sales department and Mr. Henry has appointed Fred I. Tucker of Boston, Mass., manager of the plants division.

JOHN E. BAILEY, who has been appointed assistant manager, department of maintenance and repairs, of the United States Shipping Board as direct assistant to Commander Gatewood, manager of the department, received his education at Annapolis, the University of Glasgow and the Technische Hochschule, Berlin. For seven years he had charge of naval construction at the Brooklyn Navy Yard and during the war was constructor at the Boston Navy Yard with the rank of captain. After the war he resigned to become assistant general manager of the Baltimore Dry Docks and Shipbuilding Company and continued with this company until the completion of its contracts when he resigned to take up his present duties.

EDWIN A. SHEPHERD recently assumed his duties as comptroller of the United States Shipping Board Emergency Fleet Corporation. Between the years 1891 and 1915 Mr. Shepherd was stationed at various army ordnance establishments in charge of accounting, auditing, production costs, and the like, and from August, 1915, to June, 1917, he was with the Remington Arms Company at Bridgeport, Conn. At this time he was commissioned as an officer in the ordnance department, U. S. A., and made comptroller of the small arms division. He finally attained the rank of lieutenant-colonel and became executive officer of the arsenals and administration division of the ordnance office. After leaving the army he was with the Washington office of the Remington Arms Company and represented various other firms in Washington until his appointment as comptroller of the Emergency Fleet Corporation.

T. L. CLEAR was recently appointed treasurer of the United States Shipping Board Emergency Fleet Corporation and will assume active control of the office November 1. Mr. Clear was born in Washington and became best known through his connection with the Panama canal commission by putting the financial operation of the canal on a commercial basis. During the war he was commissioned a major in the inspector-general's department of the Army and aided with the control of financial operations of the Expeditionary Force in Europe. He resigned from the Army on October 8, 1921, to assume his new duties with the Shipping Board.

OBITUARY

HENRY LYSHOLM, well-known shipbuilder and engineer, died on September 20, 1921, following several months of failing health. He was in his fifty-sixth year, having been born in Trondhjem, Norway, where he studied civil and mechanical engineering at the Technical Institute. He served his apprenticeship in practical shipbuilding at the Naval Station at Horten, Norway, which was under the direction of his father, who was a naval constructor in the Norwegian Navy. In 1888 Mr. Lysholm came to America and engaged in bridge construction work. Later he went to the Harlan & Hollingsworth shipyard at Wilmington, Del., and came under the notice of Mr. Henry G. Morse. In 1900, when Mr. Morse, as president, organized and started the New York Shipbuilding Company at Camden, N. J., he retained the services of Mr. Lysholm as technical assistant. Mr. Lysholm worked on the preliminary plans of the lay-out of the New York shipyard and proposed building ships on the templating system, similar to that employed in bridge building. Mr. Morse lent hearty encouragement to this scheme which succeeded from the start and Mr. Lysholm was made superintendent of the mold loft, structural drafting room, plate and angle shops, etc. The Lysholm templating method of ship construction soon attracted world-wide attention, and has been almost universally adopted, especially in this country. In 1916, Mr. Lysholm was one of the founders of the Pennsylvania Shipbuilding Company at Gloucester, N. J., and became its general manager. He later became vice-president and general manager of the Pusey & Jones Shipbuilding Company when that firm took over both the Pennsylvania and New Jersey shipyards at Gloucester. The strain of work during the war period undoubtedly undermined Mr. Lysholm's health and it was largely on this account that he gave up active shipyard management in August, 1918. Afterwards he was retained as advisory engineer for the torpedo boat construction work at the New York Shipbuilding Corporation and up to the time of his death he maintained an office in Philadelphia as consulting naval architect. Numerous valuable inventions relating to shipyard construction were made by him, the foremost being the Lysholm plate punching table, whereby the complete control not only of the punch but also of the movements of the plate itself by means of rollers and carriage were brought under the hands of one operator.

Henry Lysholm

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Shipping and Ship Operation News

Changes in Steamship Routes — Passenger and Freight Activities—Port Plans and Other Notes of General Interest

Materials and Supplies Valued At $35,000,000 to Be Sold Under New Plan Adopted By Emergency Fleet Corporation

Joseph W. Powell, President, United States Shipping Board Emergency Fleet Corporation, has authorized the following announcement:

The Emergency Fleet Corporation has completed its study of the surplus materials and supplies which were left over from its war activities and has had a complete inventory and appraisal made of all of this material and has now authorized the removal of all restrictions placed on the sale of general materials and supplies. This does not include ships, plants, dry docks and housing and transportation projects, each of which is now being carefully analyzed with the view of adopting definite policies looking toward their disposal.

The aim of the Corporation, in outlining its policy, has been to remove all restrictions and limitations which have tended to make difficult the purchase of Government owned supplies by the general public, corporations, or others not thoroughly familiar with usual Governmental requirements. Each of the District Directors of Sales will be authorized to make cash sales of property in amounts not exceeding $5,000 and we intend to make it just as easy to purchase from one of the Fleet Corporation's stores in quantities not exceeding this amount as it is from the usual corner grocery store. Where the materials run into values greater than $5,000, approval by the Manager of the Material Sales Division, located in Washington, will be necessary but the organization will be such as to permit immediate action on such purchases.

In developing the policy of sales, the Fleet Corporation has made provision not only for sales to the public but for transfer to other Government Departments along the lines laid down by General Dawes, for in transfers of this character the amount of the sale is returned to the Treasury, and, in addition, the Government is saved the difference between the sale value and the price that the Purchasing Department would have to pay if it went into the open market to meet its needs.

The following locations have been designated as the headquarters of the districts in which the country has been divided for the purpose of facilitating sales of the Corporation's surplus property and these storehouses will be organized to make cash sales and to facilitate the disposal of the more valuable supplies:

District	Headquarters	Director of Sales
Northeastern	Wilson Point Warehouse, South Norwalk, Conn.	J. T. Eason.
Eastern	Hog Island, Pa.	G. S. Watt.
Central	1819 West 39th St., Chicago, Ill.	W. J. Leonard.
Southern	U. S. Shipping Board Whse., 3901 Carrollton Ave., New Orleans, La.	H. R. Dillingham.
Southern District.	U. S. Shipping Board Whse., Alameda, Calif.	D. H. Meisenbach.
Oregon	U. S. Shipping Board Whse., St. Johns, Portland, Ore.	T. G. Baird.
Northern Pacific.	U. S. Shipping Board Whse., Tacoma, Wash.	R. D. Caney.

The cost of the material that will be sold under this authority was approximately $125,000,000 and its present appraised value is approximately $35,000,000.

National Association of Practical Refrigerating Engineers

The Twelfth annual convention of the National Association of Practical Refrigerating Engineers will be held at Hotel Lorraine, Philadelphia, Pa., on November 30 and December 1, 2 and 3, 1921.

Levant Arrow Completes Trials

The *Levant Arrow*, built for the Standard Transportation Company at the plant of the New York Shipbuilding Corporation, Camden, N. J., ran her trials on October 12, 1921.

The overall dimensions of the ship are 485 feet in length, beam 62 feet 6 inches, and depth 39 feet 6 inches. She is equipped with three single end Scotch main boilers and one 3,200 indicated horsepower engine, of four cylinder, quadruple expansion, four crank direct acting, surface condensing type. This engine is capable of propelling the vessel loaded to the specified draft, at a speed of 11 knots. She has a displacement of 18,277 tons.

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First Meeting of the Trustees and Council, Emergency Fleet Corporation

This group is responsible for the carrying out of the policies laid down by the United States Shipping Board in its efforts to restore the American flag to a place of supremacy on the high seas.

Photo shows L. to R., Sanford Freund, Special Counsel, William J. Love, V. P. in charge of Traffic, Nathan Smythe, Special Counsel; Elmer Schlessinger, General Counsel; Joseph W. Powell, President, Emergency Fleet Corporation; A. J. Fray, V. P. in charge of operation; J. Barstow Smull, V. P. in charge of Charters; Harry S. Kimball, V. P. in charge of Finance; Edw. P. Farley, V. P. in charge of sales.

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Notes of Interest to Steamship Operators

The steamer *Vandyck*, of the Lamport & Holt Line, is expected to arrive at New York next month from Liverpool and will be employed in the service between the United States and South America. The *Vandyck* is a twin screw steamer, 526 feet in length, of 21,000 tons displacement and the propelling machinery consists of two sets of double reduction geared turbines capable of developing a speed of 15 knots. The ship has been extensively equipped for the accommodation of passengers and the handling of cargo, the whole work having been carried out by Messrs. Workman, Clark & Co., Ltd., Belfast.

It is reported from Norfolk, Va., that the wooden steamer *Corone*, recently purchased from the Shipping Board by Pendleton Brothers, of New York, has been brought down from Claremont for repairs at Newport News. It is stated that Pendleton Brothers will soon take over four more wooden steamers, the Potter Transportation Company five, the Union Sulphur Company one and the Clinchfield Navigation Company ten, not including the *Awemsdaw* and *Diana*, which are now being repaired at Newport News for the account of the latter concern.

Should negotiations be consummated for the acquisition of the five passenger steamers of the United States Line, one of the greatest steamship consolidations will take place. It is reported that W. A. Harriman admits that the United American Lines are willing to negotiate with the North German Lloyd for the contract originally made with the United States Mail, notwithstanding the existing agreement between the organization and the Hamburg-American Line. It is thought that the cooperation of these three operators would make the establishment of one of the strongest American passenger lines in the United States, and would greatly upbuild the prestige of the American merchant marine.

It is announced that more than 500,000 barrels of Eastern apples will be shipped to English and continental markets this season. In addition 3,000,000 boxes of apples from the Northwestern states will be shipped overland to New York and other Atlantic ports for conveyance to Europe. The biggest apple shipments ever sent from the Pacific Coast will be transported on the Royal Mail liners from Vancouver, and Seattle, via the Panama Canal, as six of the company's steamers will load at Seattle between October 15 and December 15 to handle a consignment of 300,000 boxes of apples from Washington, Oregon and Idaho.

Bliss Dallett & Co., New York, have issued a new list of sailings of the Red "D" Line, a departure being scheduled each Saturday during the next three months. Commencing October 1, alternate steamers are to call at Mayaguez, the first steamer being the *Maracaibo*. Other stopping ports will include Laguayra, Curacao and Maracaibo. The steamer will touch at Curacao and Mayaguez on her return trip. The steamer *Philadelphia*, scheduled to sail October 8, will stop at San Juan, Curacao, Laguayra and Puerto Cabello, and upon her return, at Curacao and San Juan. The steamers *Zulia* and *Caracas* will also ply in this service.

California fresh fruit will be carried to European ports this month on giant freighters to be operated by the Isthmian Steamship Company, a subsidiary of the United States Steel Corporation, and the Federal Steam Navigation Company, a large British shipping concern. The vessels to be placed on this route are the *Northumberland* and *Wiltshire*, each of 17,000 tons deadweight, and equipped with refrigerator space sufficient to carry 9,000 tons of fresh fruit. The service for the Pacific Coast will include fruit shipment from Oregon and Washington. Both vessels are now in England where they will load a general cargo for the port of San Francisco, Cal., and sail sometime this month. Norton, Lilley & Company, San Francisco, Cal., are the agents for this service.

Following the action of the North Atlantic liners at New York, the Gulf steamship lines conference has lowered rates on grain and grain products to European ports. It is expected that the Montreal conference will shortly adopt rates conforming generally with those established from the North Atlantic. The Gulf conference has established rates to the United Kingdom of 21c. per 100 pounds on wheat, corn and rye; 25 cents on barley and buckwheat, and 28 cents on oats. French rates, 18, 22 and 26 cents on the same products respectively for September and October and 20, 24 and 28 cents for November and December. Rates to Hamburg, Bremen, Antwerp and Rotterdam have been placed at 19½, 24 and 29 cents for September and October, and 21½, 26 and 31 cents for November and December.

The Matson Navigation Company announces the inauguration of a new service from Los Angeles to Hawaiian ports.

Trials of the Peabody burner system installed on the Shipping Board steamship *Independence*, are still being conducted, it was announced recently, contrary to published reports that the tests had been successfully completed. The name of H. B. Taylor, Chief Turbine Engineer of the Board, at 45 Broadway, New York, was erroneously connected with the report.

Providence, R. I., Considered as Starting Point for Atlantic to Pacific Route

It is reported from Providence, R. I., that the Ludwig Lines, which is establishing a service of steamers from Atlantic to Pacific Coast ports, has been seriously considering Providence as a starting point for regular monthly sailings. It is understood that the lines are now carrying lumber from the Pacific Coast to Providence.

The facilities at the Rhode Island port are considered especially good, the harbor, having a channel 30 feet deep at mean low water, 600 feet wide, and 27 miles long to the Atlantic Ocean. State Pier No. 1, where several transatlantic liners now dock is 600 feet by 120 feet with a shed 400 feet by 110 feet with 30 feet of water alongside. There are also 66 private wharves of various sizes.

The port is equipped with extensive cold storage for export products, and according to the Providence Chamber of Commerce, which is actively interested in the city's maritime affairs, Providence is the largest New England oil distributing port and has many thousands of square feet of warehouse storage capacity and track storage for several thousand cars.

State Pier at Field's Point is 3,000 feet long, of granite construction, with double tracks its entire length. Several of the biggest oil companies, notably the Standard Oil Company and the Mexican Petroleum Company, have established oil stations of considerable size at the port.

Joint Committee Named to Frame Constructive Policies for American Shipping

A joint committee, representing the three elements of shipowning, building and operating in the merchant marine, has been appointed to frame and recommend to Congress and the Shipping Board further constructive policies in aid of American shipping. This joint committee is established as a result of a conference of owners, builders and operators at the office of the American Steamship Owners' Association, 11 Broadway, New York, on September 16, when concerted action by the three elements was decided on.

For the American Steamship Owners' Association the members of the Joint Committee are:

H. H. Raymond, President, Clyde-Mallory Lines and President of the American Steamship Owners' Association; Frank C. Munson, President, Munson Steamship Line; W. A. Harriman, Chairman of the Board, United American Lines., Inc.; J. R. Gordon, Traffic Manager, Union Sulphur Company; H. F. Alexander, President, Pacific Steamship Company.

For the Council of American Shipbuilders, Inc.: Homer L. Ferguson, President, Newport News Shipbuilding & Dry Dock Company and President of the Council of American Shipbuilders, Inc.; Antonio C. Pessano, President, Great Lakes Engineering Works; H. E. Lewis, Vice President, Bethlehem Shipbuilding Corporation; Henry C. Hunter, Secretary-Treasurer, Council of American Shipbuilders, Inc.

For the United States Ship Operators' Association: Charles H. Potter, President, Potter Transportation Company and President of the United States Ship Operators' Association; Clifford D. Mallory, President, C. D. Mallory & Company; W. D. Benson, Vice President, Frank Waterhouse & Company; Albert R. Lafonta, President, Trosdal, Plant & Lafonta; Matthew Hale, President, South Atlantic Maritime Corporation.

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Three Weeks Shipping Exhibit at London Proves Successful, Over 300 Companies Taking Part

Great Confidence Shown in Future of British Shipping Industry—Lectures and Many Important New Appliances Feature Sessions—Situation in Germany Discussed

Despite the prevailing abnormal slump in all phases of the British shipping industry, the International Shipping, Engineering and Machinery Exhibition which was held at Olympia, London, September 7 to 28, was well patronized not only as regards attendance but in respect to the large number of exhibitors. It was a venture requiring considerable courage to promulgate under the present business conditions and its success is a matter of congratulation to the organizers. Practically the entire space in the exhibition hall — the largest in Great Britain—was occupied by 332 exhibitors, most of whom were directly or indirectly interested in the construction and operation of ships. Such a response under present conditions is noteworthy and gives an indication of the Britisher's faith in the future.

The exhibition was conducted under the direction of Sir Charles A. Parsons, honorary president; Lord Weir, Sir Archibald Denny, Sir Eustance H. Tennyson D'Eyncourt, Sir Alexander B. W. Kennedy, Sir Archibald Ross, Colonel R. Saxton White, as honorary vice-presidents, and the organizers were F. W. Bridges & Sons, Ltd.

The exhibition was opened on September 7, in absence of the president, by Captain Charles H. Riall Sankey, president of the Institution of Mechanical Engineers, and Commander Sir Trevor Dawson, vice-chairman and managing director of Vickers, Ltd. In speaking on shipping and commerce Commander Sir Trevor Dawson called particular attention to the use of heavy oil engines for ship propulsion, saying that in six years the number of motor-ships afloat had increased from 290 to 1,447 and that the tonnage had increased more than a million. As regards the economy of this drive, he said that they were about the only ships that were being operated at the present time without a loss. He stated that the present success of British industry depended upon an increase in volume of production and a decrease in the cost.

"Industry," he says, "was thus put in an excellent economic condition to compete successfully in the markets of the world." The average wage paid in Germany he ascertained to be about four marks per man per hour for an 8-hour day, whereas in Great Britain the average wage paid was about seven times that amount under the prevailing exchange rate.

In speaking of the present commercial situation, he said that the greatest question to be settled was undoubtedly that of exchange.

One noteworthy feature of the exhibition was that it introduced quite a number of newly-invented devices. There were several of the well established shipbuilding concerns which were not represented, but for the most part the exhibition may be considered as one of exceeding interest. Among the more important appliances displayed might be mentioned air compressors, anti-corrosion and rust proofings, anti-friction metals, boilers and their accessories, cabin fittings, ship chandlery, cold storage machinery, diving apparatus, various electrical machinery as applied to ship operation, a large number of marine engines, principally internal combustion engines, feed water heaters, hydraulic plant machinery, lifesaving appliances, electrical lighting sets, machine tools of various types applying more particularly to the shipping industry, various nautical instruments, meters and measuring devices, oil fuel burners and their appurtenances, pumps and pumping plants, reversing gears, wire ropes, searchlights, ship fittings, steering gears, superheaters, welding plants, both electrical and oxy-acetylene, electrical and steam winches and wireless apparatus.

There were only seven shipbuilders represented at the exhibition, the greater number of the stands displaying machinery and devices used in connection with the shipbuilding industry.

General View of Marine Show, London, England

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Shipbuilding and Shipyard Development

What the Shipyards Are Doing—Dry Dock Notes—Launchings—New Engineering Projects

Seven Million Dollar Order For Six Submarines May Be Placed In American Shipyard by Argentina

Biggest New Construction Contract in Months Awaited by United States Builders—Placing of Order Looked for in Near Future—Two Types of Boat Considered—May Employ 2,000 Workers

A contract for six submarines of either single or double hull construction, involving in the former case an expenditure of approximately $5,400,000 and in the latter, about $7,200,000; and which if placed will probably provide employment for about 2,000 shipyard workers for 2½ years, is the latest prospect for new business attracting attention in eastern marine circles. The Argentine Government, represented by a Naval Commission headed by Captain Fleiss, is understood to be in the market for these boats, and preliminary estimates of cost are being submitted. The Argentine Government is reported as having recently floated a $50,000,000 bond issue, part of the proceeds of which may be used for the purchase of submarines.

According to information received by MARINE ENGINEERING AND SHIPPING AGE, one of the designs submitted to the commission provides for a boat equipped with twin screws, driven by two Diesel engines of about 500 horsepower each, and two motors for submerged running.

The preparation of these plans, it is stated, also provide for a double hull boat of about 210 feet in length, costing close to $1,200,000 and a single hull type about 185 feet long to be built at an estimated cost of approximately $900,000 each.

In addition to the two motors for submerged running and the surface propulsion equipment, it was learned that other installations for these boats would include powerful storage batteries (about 35 plates each), electric drills, electric lathes, and wireless outfits. It is understood that the vessel will have four torpedo tubes forward and one aft, and mount one deck "wash gun" (about 3 inch).

Unofficial figures give the displacement as follows: Gross submerged tons, 672; net submerged tons, 568; light tons, 485; submerged depth, 200 feet.

Information as to just when this contract will be placed was not available, although it is anticipated that a final decision will be arrived at in the near future.

NEW YACHT CONSTRUCTION

Contracts for Five Boats Costing a Half Million to Be Let

Contracts for five yachts, having a total cost of over a quarter of a million dollars, are expected to be placed within the next two or three weeks; bids have been received on two yachts which will cost in excess of $140,000; a 42-foot runabout is under contract and a 101-foot steel houseboat is in course of construction at the Kyle & Purdy shipyard, City Island, New York, the latter to cost about $115,000, according to official information obtained by MARINE ENGINEERING AND SHIPPING AGE. The total of this work about to be contracted for and already under construction is well in excess of half a million dollars. The firm of Henry J. Gielow, Inc., 25 West 43rd Street, New York City, naval architects and marine engineers, has prepared plans and specifications and is in charge of the work.

Contracts which are expected to be placed in the near future include a 94-foot wooden motor yacht equipped with a 300 horsepower gas engine; a 60-foot runabout also equipped with a 300 horsepower gas engine; a 90-foot full sail auxiliary schooner of wood construction equipped with a 60 horsepower gas engine; an 87-foot steel auxiliary ketch having a 150 horsepower engine to develop a speed of 9 knots, and a 75-foot full sail wood auxiliary having a 40 horsepower gas engine.

Bids have also been received for the construction of a 108-foot steel motor yacht equipped with a 250 horsepower gas engine, and a 37-foot, 40 horsepower cruiser. A 42-foot runabout is under construction in Chicago and the Kyle & Purdy shipyard, City Island, New York, is constructing a 101-foot steel houseboat which will be equipped with two 120 horsepower Diesel engines.

Plans and specifications have been completed for those vessels for which contracts have not yet been placed.

FLOATING SAFE EXHIBITION

Proves Inventor's Contention When Put Overboard at Providence

Several hundred people witnessed the successful exhibition of a floating safe which was dropped overboard from State Pier No. 1, Providence, R. I., on the afternoon of Wednesday, October 12, with the inventor, Menotti Nanni, of Chicago, locked inside. The safe, which is cylindrical in shape, was fitted inside a huge iron tank, which in turn was lowered into the harbor from a derrick boat and gradually sank beneath the water. The crowd stood breathless as air bubbles came to the surface. With a sudden rush the inner safe shot upward in the center of a small water spout and remained floating quietly on top of the water. It was then hoisted on board a derrick boat, the door unlocked and Mr. Nanni appeared perfectly safe and sound after his brief trip into the harbor.

The demonstration was given by Mr. Nanni to prove the practicability of his invention, which is intended for use on ocean ships for the preservation of valuables at sea in case of disaster to the vessel. The safe has an overall length of 9 feet 8½ inches with an inside length of 8 feet, outside diameter 5 feet 5½ inches, and inside diameter 4 feet 5 inches. It has a displacement (empty) of 112 cubic feet with a capacity of 93.2 cubic feet, and is equipped with eighty safety boxes in which valuables are kept.

It is Mr. Nanni's plan to install his floating safes in a large vertical cylindrical steel casing placed in a well amidships, the top of the well being flush with the upper deck of the ship and covered with a loose-fitting, easily removed cap. The safes are placed one on top of another, the first, second and third class passengers each having a safe for their valuables. The two lower safes serve as a repository for registered mail and for the most precious part of the ship's cargo. Access is gained to the safe through doors provided in both the outer and inner casings at the various decks. It is stated that if a ship equipped with such a system of floating safes should sink, the cover of the well would float off, the water would enter the steel casing and force the safes to rise to the surface, where they would float until picked up by passing craft.

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Three Electric Drive Ferryboats To Be Built for City of New York at a Cost of Over a Million and a Quarter

Department of Plant and Structures Completing Plans and Specifications for Most Modern Craft for Manhattan-Staten Island Service—New York Leads Eastern Cities With Installation of Electricity in Municipal Boats

The Department of Plant and Structures of the City of New York has practically completed plans for three electrically driven ferryboats, which are to be built under contract and placed in service between Manhattan and Staten Island.

Grover A. Whalen, Commissioner, has made the following statement in regard to these boats:

"The vehicular traffic between Staten Island and Manhattan, which has been increasing year after year, will make exceptionally heavy demands on the transportation facilities of the city when the new piers on Staten Island are completed and placed in service. To meet these demands I have deemed it necessary that additional boats be built. The requirements of this service are—first, maximum accomodations for trucks and cars; second, the highest practicable speed; and, third, maximum economy in operation.

"The boats which are designed with four runways for vehicles on the main deck and accommodation for passengers on the upper deck will be about 250 feet long. Steel is to be used as far as possible in the construction, including the main deck, the guards and the sides of the superstructure. Certain features that have been adopted on the new City ferryboat the *President Roosevelt* now nearing completion at the yard of the Staten Island Shipbuilding Company, are being incorporated in our design. These include side entrance doors to the upper house, cross seats in the upper cabin, outboard seats along the rails, mechanical davits, etc.

"The most noteworthy departure from the accepted practice of a quarter of a century lies in the type of propelling machinery that has been adopted. In order to secure greater economy in operation than is possible with reciprocating engines, it has been decided to install a steam turbine-driven generator supplying high tension alternating current to a motor at each end of the boat, the latter being direct connected to the propeller shaft. It will thus be feasible to run the two propellers at different speeds which, it is expected, will result in increased propulsive efficiency as compared with the present method of attaching both propellers to one through shaft and revolving them at the same speed.

"We are going to utilize the advantages of high pressure steam, superheated to a high degree and applied to a comparatively small, fast running turbine. Reduction gears were considered for the driving shafts, but discarded as unsuited to ferryboat service. Electric reduction seems to serve the needs of this service admirably, as it is flexible, easily controlled and provides means of quick maneuvering in restricted waters. As compared with a compound, reciprocating engine, a steam turbine will consume only about half the steam and consequently half the fuel.

"There will be no departure from present practice as far as the duties of the pilots are concerned, as all signals will be communicated to the engine room by the usual mechanical telegraphs. Control of the boat will be in the hands of the engineer on watch who will start, stop, reverse, and change the speed of the propellers on signals from the pilot house. We consider that the navigating officers have sufficient responsibility in handling a boat loaded with thousands of passengers across such a body of water as New York Bay without adding to their duties by placing the control of the propulsion motors in the pilot house. This more properly comes under the care of the engineer on watch as he is in close touch with the machinery and knows just what is going on below decks at all times. The advocates of pilot house control have many convincing arguments, but we do not consider such control advisable for our service.

"I wish to say that the question of steam-electric versus Diesel-electric drive has been carefully considered in the design of our new boats, as has also the question of coal vs. oil for fuel. Whereas, we all know that an oil engine is much more economical in the use of fuel than a steam turbine, its use on our ferryboats would introduce undesirable complications. The chances of a breakdown would be increased, which, for boats running on schedule, must be reduced to a minimum.

"Regarding the kind of fuel to be burnt under the boilers, we are designing these boats for coal. There are many points to be considered in deciding between coal and oil, and we have given careful thought to the advantages and disadvantages of each.

"The working out of the design has been entrusted to Mr. Chas. T. Perry, Electrical Engineer, and Mr. Martin G. Kindlund, Naval Architect, both members of the engineering staff of the Department of Plant and Structures. They are striving to produce a ferryboat that will embody the most recent approved ideas as to construction and propulsion and one that will be a credit to our city."

It was estimated the three boats would cost over a million and a quarter dollars.

TO LAUNCH FERRY

The President Roosevelt, Costing $736,400, Nearly Ready

The new Municipal ferryboat *President Roosevelt* will be launched at noon on Saturday, November 5, at the yard of the Staten Island Shipbuilding Company at Mariner's Harbor. The sponsor will be Mrs. Grover A. Whalen. The new ferryboat will be put in service on the Staten Island Municipal Ferry on Thanksgiving Day, November 24th.

This announcement was made to-day by Grover A. Whalen, Commissioner of Plant and Structures, who said:

"This addition to the Municipal Ferry fleet, so urgently needed because of the increase of traffic, will be the finest ferryboat yet built. Its cost is $736,400. It will be a 2,000-ton boat, of the same size and type as the large boats—250 feet long, 66 feet wide, 3,500 horse-power—but a number of improvements suggested by experience in the operation of the present fleet have been embodied in the new boat.

"The *President Roosevelt* will have a capacity of 3,500 passengers and 26 vehicles, with seats for 1,700 passengers. The saloon deck will be open between the stacks, with side doors to the promenade deck in addition to the end doors.

"This is the first ferryboat built by the City of New York since 1914, when the *Mayor Gaynor* was built. Like the *Richmond*, it has been built in New York City, by citizens of this city, and all the work of preparing plans and specifications and supervising the construction has been done by employees of this Department.

"Mayor Hylan, who was responsible for securing the funds for the construction of this boat, will preside at the launching of the *President Roosevelt*.

"The *President Roosevelt* will be a welcome addition to the Staten Island fleet, as it is absolutely needed to permit the Department to maintain the increased service provided in the new schedules. The number of round trips has been increased from 62 to 74 and during a short period, morning and evening, the boats are run on a ten-minute headway, requiring the operation of all the boats, and this schedule will be liable to interruption until the new boat is in service."

Bethlehem Corporation Buys Baltimore Shipyard

According to an announcement by Eugene C. Grace, president of the Bethlehem Steel Corporation, his company has purchased the 48-acre plant of the Baltimore Dry Docks & Shipbuilding Company, thus giving the Bethlehem company additional facilities located on the main harbor of Baltimore and supplementing the plant at Sparrows Point, which means that the corporation will have a complete equipment of dry docks and marine railways to accomplish all kinds of ship repair work at the port of Baltimore. Financial details of the purchase were not disclosed, but it is rumored that the purchase price is about $3,500,000. The property consists of three large ship repair and shipbuilding plants and will be continued in operation on ship repair work.

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Million Dollar Contract for Reconditioning the St. Louis Is Under Way By Todd Shipyards Corporation

Famous Steamship to Be An Oil Burner, Equipped With Every Modern Convenience for 'Round-the-World Tour With Exhibits of American Manufacturers

Five hundred men are at work reconditioning the steamship *St. Louis* in readiness for her world trade cruise, beginning in January, 1922, and ending the following December. On this cruise the *St. Louis* will carry the exhibits of 300 to 350 American manufacturers to the four points of the compass.

The contract for the reconditioning of the famous liner was awarded to the Todd Shipyards Corporation by the Anderson Overseas Corporation, owners of the *St. Louis*. The work is being performed at the Robins Dry Dock and Repair Company's plant in Erie Basin and will provide employment for hundreds of shipworkers until after Christmas. The actual cost of the reconditioning has not been stated, but it is believed that it will run close to a million dollars. The contract calls for the ship to be complete and ready for sea in the early part of January.

According to the specifications, the *St. Louis* will be converted into an oil burner by the installation of Todd burners and will be equipped with every modern device known for the comfort and safety of her passengers. The arrangement of the ship will differ to some extent from what it was at the time when she was the crack ship of the American Line. Because of the climatic conditions to be met with during the eleven months cruise, a ventilation system which will serve all the inner and lower rooms in hot countries, and a heating system which will make the same rooms and quarters comfortable in cold countries, has been fully arranged for.

A fully equipped hospital, with isolation ward, operating room, etc., is also included in the plan. On account of one entire deck having been reserved for exhibition purposes, as well as portions of three other decks, great care had to be exercised so that the comfort and safety of the passengers would not be interfered with. One exhibition deck, however, will have an uninterrupted space of about 550 feet long for exhibits. This does not include the automobile section, which will carry practically a New York automobile show around the world.

At the offices of the Anderson Overseas Corporation it was stated that strict instructions were given the Todd Shipyards Corporation that the *St. Louis*, when finished, must be as modern as any ship afloat, as comfortable as the most comfortable, and as safe as it is possible to make her—the pride of the American Nation, whose manufacturers' products she will carry to the four quarters of the globe.

The *St. Louis* was the first 100 percent all steel American steamer ever built, and at that time was the fastest, most modern and the finest ship afloat. She was christened by the former Mrs. Grover Cleveland at Philadelphia, the late President Cleveland and his Cabinet attending.

American Crew Signs on at Lowest Wage Rate Since Prior to the War

As a result of the large number of seamen out of jobs at Norfolk, Va., vessels signing crews here are said to be able to get men at the lowest wage since prior to the war. As an instance, the American steamer *Osage* recently signed on a crew for a long voyage at wages less than those paid before the war. Little difficulty was encountered by the officers of the *Osage* in obtaining a full crew at the lowest scale recorded here for service on a steamer in five years.

The *Osage's* crew was signed on for a voyage to the west coast to load and thence to a Mexican port to discharge. She is operated by Moore and McCormack, of New York.

Where the scale to which the men were asked to agree last summer allows the ship's carpenter $85 per month, the man holding that position aboard the *Osage* signed on for $42.50. The boatswain signed on for $40, where under the scale offered, he would have received $80; the four able seamen are getting $35, against $72.50; two ordinary seamen receive $25, against $52.50; three oilers $40, against $80; six firemen $35, against $75; the first cook $90, against $105; the baker $75, against $90; three coal passers, $25, against $60; two messmen $40, against $60.

Tebo Yard Overhauling Yacht

The firm of Tams, Lemoine & Crane, naval architects, 52 Pine Street, New York City, has in charge the work of overhauling the three-masted auxiliary schooner yacht *Alcyone*, the contract for which was awarded on October 19 to the Tebo Yacht & Basin Company, Brooklyn, N. Y., at a price of approximately $75,000. The *Alcyone* is to have a new steel deck house, two Winton Diesel engines of 300 horsepower each, Westinghouse generator and motor, and will undergo a general overhauling.

WEST CHOPAKA LAUNCHED

Ceremonies Followed by Discussion of New Los Angeles-Orient Line

Marking the completion of four years of the keenest shipbuilding activity and the construction of around 320,000 tons of shipping, costing approximately $72,000,000, the Los Angeles Shipbuilding & Dry Dock Company launched its thirty-fifth and last steel freighter on the United States Shipping Board contract, September 19, 1921.

The freighter, christened *West Chopaka* by Mrs. Fred L. Baker, wife of the president of the company, was the last of that group of 11,000 ton flush deck freighters, in which are included *West Lewark, West Faralon, West Greylock, West Prospect* and *West Chopaka*. These vessels, of which the first three have been chartered by the Williams, Dimond & Company from the United States Shipping Board, are particularly notable for their ease and economy of operation; their exceptional cargo handling facilities, permitting as many as nine separate gangs of stevedores to work at one time; and their very satisfactory speed and fuel consumption.

Following the launching, some three hundred guests of the officers of the shipbuilding company were taken on board the steamship *Harvard* for a cruise around Catalina Island. Among the guests were many of the most representative men in business affairs of Los Angeles, including Meyer Lissner, of the Shipping Board; Joseph Tynan, of the Bethlehem Plant; Harry Chandler, E. P. Clark, Reese Llewellyn, Honorable George E. Cryer, Mayor of Los Angeles, with several of the members of the Los Angeles City Council, Harbor Commission, etc., Sylvester Weaver and Frank Wiggins, of the Los Angeles Chamber of Commerce, with several of its members, Vice-Admiral W. R. Shoemaker, with several officers of the Pacific Fleet, and Colonel H. J. Hatch, in command of Fort MacArthur. During the cruise Fred L. Baker, president of the shipbuilding company, and also president of the Los Angeles Steamship Company, with Erle M. Leaf, vice-president of the shipbuilding company and also secretary of the Los Angeles Steamship Company, held a meeting on board the *Harvard*, attended by several of the prominent men present, to discuss with Meyer Lissner their plans for the formation of a Los Angeles-Orient steamship line, for freight and passenger service. It is understood that their plans are rapidly taking shape and that the Los Angeles Steamship Company, who operate the *Yale* and *Harvard*, may be used as a nucleus for the creation of a powerful steamship company, embracing the highest class of service to Oriental ports, taking advantage of the business connections developed by the Los Angeles Pacific Navigation Company, with which Messrs. Baker and Leaf were also prominently identified.

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Marine Construction News of the Month

Ship Contracts — New Ship Concerns and Shipyard Improvements—Terminal Projects—Government Contracts

SHIPS AND SHIPBUILDING

Lake Sabin Awarded, Hoboken, N. J.—At a price of $4,869, the Tietjen & Lang Dry Dock Company, was the successful bidder for repairing the Shipping Board steamer Lake Sabin, bids for which were opened at 45 Broadway, New York, on October 4.

To Install Oil Burners, New York.—The White Fuel Oil Engineering Company has been awarded the contract to supply oil burning systems for the steamships Fort St. George and Monterey at an approximate total cost of $16,250.

The Cable Ship.—It is announced that all bids for the construction of the proposed cable ship for the Western Union Telegraph Company have been received from American and foreign yards. No definite information as to prices submitted or when a decision will be reached is available at present.

Three Contracts Awarded, Shooters Island, New York.—At the opening of bids at 45 Broadway, New York, on September 28, for repairs to Shipping Board steamers, the Standard Shipbuilding Corporation was awarded the steamers Buckeye State for general overhauling at a price of $19,929; the Eclipse at $2,100, and the Great Falls, $409.

Bids for Ferryboat.—It is announced that bids have been submitted for the construction of two new standard type ferryboats for the Pennsylvania Railroad to be used on the run between Camden and Philadelphia. It is believed that some time will elapse before a definite decision is reached as to whether or not construction will go forward in view of the agitation for a bridge between Camden and Philadelphia.

Repair Contract Award, Shooters Island, N. Y.—The Standard Shipbuilding Corporation was awarded the contract for repairing the steamer Centennial State, bids for which were opened by the Shipping Board at 45 Broadway, New York, on October 4. The Standard Company's bid was $9,520. Other bids were as follows: National Dry Dock, $10,714; Robins Dry Dock & Repair, $11,830; Morse Dry Dock & Repair, $15,190.

Launchings, Etc., Chester, Pa.—The Merchant Shipbuilding Corporation announces that two 11,000 ton freighters, being built for the American-Hawaiian Steamship Company will be launched about the middle of November. It is also stated that a list of engineering specialties, to be constructed at the Chester yard will be announced at an early date.

To Overhaul Vessel, San Francisco, Cal.—The former German four-masted bark Walkure, recently purchased by the Robert Dollar Company has been rechristened the William Dollar, and will be brought to the Union Plant of the Bethlehem Shipbuilding Corporation, Ltd., for a thorough overhauling. The vessel is the largest sailing craft of its kind and is capable of carrying 5,100 deadweight tons, or 3,000,000 feet of lumber.

To Repair Motorship, Oakland, Cal.—The motorship LaMerced, which was recently rammed by the Mexican steamer Korrigan III, has been sufficiently repaired by rescue tugs to enable her to be towed to the Moore Shipbuilding Company's plant at Oakland, where she will be repaired. The vessel had a hole several feet wide torn in her starboard side amidships and cut to the waterline. The LaMerced belongs to the Walter S. Scammel Company, and was from San Pedro in ballast, bound north for cargo.

Fast Cruiser Launched, Philadelphia, Pa.—The light cruiser Richmond was launched from the yard of William Cramp & Sons Ship & Engine Building Company, on September 28, for the United States Navy. The new Richmond takes the place in the navy of the old steam sloop Richmond which retired in 1905. She is 555 feet in length and 55 feet breadth, with a displacement of 7,100 tons, and has a speed of 35 knots. She is equipped with twelve 6-inch guns, two anti-aircraft guns, smaller guns and two torpedo tubes. The vessel has accommodations for the carrying of airplanes. She is an oil burner.

Steamer Damaged, Victoria, B. C.—Examination of the Arizonan, in the Esquimalt dry dock, disclosed that the vessel had sustained serious damages when she struck on Kellet Bluff. At least ten bottom plates will have to be renewed and a number of frames straightened. Damage is confined to the starboard side, well abaft of the engine room, and extends to the propellers, the blades of which have been twisted. Two large holes have been ripped through the steel plates at the starboard bilge, while three smaller holes are located further aft and near the keel. Two keel plates are damaged, and the after tanks were punctured.

May Buy Seven Steamers, New York.—Over a million dollars will be spent by the City of New York for the establishment of three ferry lines, one at Hamilton Avenue, another at Atlantic Avenue and a third at Fulton Street. According to present plans, the purchase of seven steamboats and their subsequent reconditioning at an estimated total cost of from $300,000 to $500,000 is expected.

Two steamers are used on the Atlantic Avenue line, two on the Hamilton Avenue line, two on the Fulton Street line, with one reserve boat. It is expected that negotiations will soon be under way for the purchase of these vessels by the city, and it is believed that if they are taken over, considerable reconditioning work will be done.

New River Tug Planned, Paducah, Ky.—The Joyce Watkins Tie Company is reported as contemplating the construction of a sternwheel river towboat for use in southern traffic. The boat will be about 135 feet in length, propelled by a twin compound condensing engine and the boilers equipped to burn oil for fuel.

Pump and Turbine Award, Brooklyn, N. Y.—The Clinton Dry Docks has been awarded the contract for the installation of pumps and turbines on the New York fireboats James Duane and Thomas Willet, bids for which were opened on October 3. The company's figure was $45,890.

Would Increase Passenger Accommodations.—The Pacific Steamship Company (Admiral Line), has asked the United States Shipping Board Emergency Fleet Corporation to make numerous changes in the passenger liners operated between Puget Sound and the Orient so as to increase the third class passenger accommodations to 450 persons. The vessels include the Wolverine State, the Creole State and Granite State, now running in the Manila-East India service. The Golden State, another of the vessels being run by the company has already been changed, having more accommodations and better ventilation. Increasing applications for reservations from Chinese laborers is responsible for the company's request, and the company hopes in this way to assist in solving the problem of transporting these laborers between Manila and the Hawaiian Islands where a shortage of laborers is acute.

Will Overhaul City Boat, New York.—Bids are expected to be invited within the next two weeks by the Department of Plant and Structures of the City of New York for repairing the steamer Patrol, formerly a Police Department boat. It is understood that the contract will include considerable hull work with the possibility of installing an oil burning system. The Patrol is 135 feet long and of 235 gross tons.

To Build Motor Vessel for South, St. Louis, Mo.—The office of the Secretary of the Mississippi River Commission, 1311 International Life Building, will receive sealed proposals until 11 A. M., November 15, 1921, for the construction of one survey and inspection motor vessel. Further details and information may be obtained upon application at that office.

Revising Red "D" Bids, New York.—Latest information obtainable with regard to the proposed two new ships for the Red "D" Line, bids for which were submitted some weeks ago, is to the effect that the lowest bidders for these vessels are revising their figures and will submit new propositions in the near future following which, it is hoped, a decision to proceed with construction will be reached. It is believed that the vessels will cost close to $1,000,000 each.

Robins Yard Awarded Huron Repairs, Brooklyn, N. Y.—The Robins Dry Dock & Repair Company was awarded the contract for repairing the United States Shipping Board steamer Huron, at a price of $21,990. Bids were opened at 45 Broadway, New York, on Wednesday, October 5. The work includes repairs to the boilers, engines, tank tops, hull and electric lighting system. There were nine bidders, the prices ranging up to $33,660 by the Staten Island Shipbuilding Company.

Tanker Launched, Chester, Pa.—The 10,000-ton oil tanker Samuel Q. Brown, built for the Tidewater Oil Company, was launched from the yard of the Merchant Shipbuilding Corporation on Saturday, October 15. The vessel is 424 feet in length, 58 feet beam, 33 feet depth, and has a capacity of 70,000 barrels of oil in her eighteen main cargo tanks. Propulsion is by single-screw and her speed is 10½ knots. The ship will be driven by a triple expansion reciprocating engine developing 2,700 indicated horsepower. The appointments of the ship are modern in every particular, having an up-to-date electric plant, refrigerating plant, sanitary and ventilating arrangements, etc. In addition to the eighteen cargo oil tanks, provision has been made for 60,000 cubic feet of package space.

Engine Contract Award, New York.—The Hooven, Owen Rentschler Company, New York City, has been awarded a contract for two 2,000 horsepower engines which are to be installed in the steamship San Jacinto, which is now undergoing a general overhauling at the yard of the Tietjen & Lang Company, Hoboken, N. J. The contract involves about a hundred thousand dollars.

Large Repair Job, San Francisco, Cal.—It is learned that the steamship Lurline is to be extensively reconditioned and is now in dry dock at San Francisco. It is estimated that the cost of overhauling this vessel will be about $225,000. The steamer Manulani will be placed on the Puget Sound-Honolulu route to take the Lurline's place.

Madawaska Bids, New York.—Bids for the extensive reconditioning of the army transport Madawaska were opened at the Army Base, Brooklyn, N. Y., on September 26, the Baltimore Dry Docks & Shipbuilding Company, Baltimore, Md., submitting the lowest figures. The bids were submitted in two sections, bid "A" giving the figure for reconditioning work with old boiler repairs, and "B" including new boilers. The company's bids were (A) $167,000, 97 days, and (B) $197,000, 180 days.

Accommodation Repairs, New York.—Specifications are being prepared by the United States Shipping Board, 45 Broadway, New York, for the rearrangement of accommodations on the steamship George Washington to provide closed quarters in the present third class accommodations. The work to be done also includes the installation of 85 electric heaters in those rooms not equipped with steam heat. The electric heaters will be mounted in units one, two and three to a case of 500 watt—110 volts. The Board has appropriated $40,000 for this work.

Derrick Boat.—The United States Engineer Office, Nashville, Tenn., will receive proposals until 11 a. m., November 16, for one steel derrick boat. Further information may be obtained on application.

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CONSTRUCTION FOR NAVY

Vessels under construction for United States Navy and their degree of completion as reported September 30, 1921, by the Bureau of Construction and Repair, Washington, D. C., are as follows:

Type Number and Name	Contractor	Per Cent. of Completion Oct. 1, 1921 Total
BATTLESHIPS (BB)		
45 Colorado	New York S. B. Corpn.	80.7
*47 Washington	New York S. B. Corpn.	69.7
48 West Virginia	Newport News S. B. & D. D. Co.	62.5
49 South Dakota	New York Navy Yard	34.6
50 Indiana	New York Navy Yard	32.5
51 Montana	Mare Island Navy Yard	27.6
52 North Carolina	Norfolk Navy Yard	36.6
53 Iowa	Newport News S. B. & D. D. Co.	29.5
54 Massachusetts	Beth. S. B. Corpn. (Fore River)	10.4
BATTLE CRUISERS (CC)		
1 Lexington	Beth. S. B. Corpn. (Fore River)	25.5
2 Constellation	Newport News S. B. & D. D. Co.	14.5
3 Saratoga	New York S. B. Corpn.	28.4
4 Ranger	Newport News S. B. & D. D. Co.	2.7
5 Constitution	Philadelphia Navy Yard	11.1
6 United States	Philadelphia Navy Yard	10.7
SCOUT CRUISERS (LIGHT CRUISERS) (CL)		
4 Omaha	Todd D. D. & Const. Corpn.	94.7
5 Milwaukee	Todd D. D. & Const. Corpn.	92.5
6 Cincinnati	Todd D. D. & Const. Corpn.	87.4
7 Raleigh	Beth. S. B. Corpn. (Fore River)	63.7
8 Detroit	Beth. S. B. Corpn. (Fore River)	68.5
†9 Richmond	Wm. Cramp & Sons Co.	74.
10 Concord	Wm. Cramp & Sons Co.	68.
11 Trenton	Wm. Cramp & Sons Co.	51.
12 Marblehead	Wm. Cramp & Sons Co.	46.
13 Memphis	Wm. Cramp & Sons Co.	40.

*Battleship No. 47 Washington launched Sept. 1, 1921.
†Scout (light) cruiser No. 9 Richmond launched Sept. 29, 1921.

AUXILIARIES		
Repair Ship No. 1, Medusa (AR1)	Puget Sound Navy Yard	69.3
Dest. Tender No. 3, Dobbin (AD3)	Philadelphia Navy Yard	66.3
Dest. Tender No. 4, Whitney (AD4)	Boston Navy Yard	34.9
Sub. Tender No. 3, Holland (AS3)	Puget Sound Navy Yard	21.5
Aircraft Tender, Wright (AZ1)	Tietjen & Lang	92.
PATROL VESSELS		
Gunboat No. 22, Tulsa (PG22)	Charleston Navy Yard	70.8

Authorized but not under construction or contract.
(1) Transport No. 2.

DESTROYERS		
338 Wasmuth	Mare Island Navy Yard	99.5
339 Trever	Mare Island Navy Yard	97.5
340 Perry	Mare Island Navy Yard	75.3
341 Decatur	Mare Island Navy Yard	70.2

Destroyers authorized but not under construction or contract.
(12) Nos. 348 to 359 inclusive.

SUBMARINES		
115 S-10	Portsmouth, N. H., Navy Yard	93.9
116 S-11	Portsmouth, N. H., Navy Yard	91.8
117 S-12	Portsmouth, N. H., Navy Yard	91.
118 S-13	Portsmouth, N. H., Navy Yard	87.6
123 S-18	Electric Boat Co. (Quincy)	97.
124 S-19	Electric Boat Co. (Quincy)	96.5
125 S-20	Electric Boat Co. (Quincy)	98.5
126 S-21	Electric Boat Co. (Quincy)	94.9
127 S-22	Electric Boat Co. (Quincy)	95.8
128 S-23	Electric Boat Co. (Quincy)	94.
129 S-24	Electric Boat Co. (Quincy)	93.
130 S-25	Electric Boat Co. (Quincy)	93.5
131 S-26	Electric Boat Co. (Quincy)	92.4
132 S-27	Electric Boat Co. (Quincy)	91.
133 S-28	Electric Boat Co. (Quincy)	91.6
134 S-29	Electric Boat Co. (Quincy)	90.5
136 S-31	Electric Boat Co. (San Fran.)	97.5
137 S-32	Electric Boat Co. (San Fran.)	95.9
138 S-33	Electric Boat Co. (San Fran.)	99.2
139 S-34	Electric Boat Co. (San Fran.)	95.3
140 S-35	Electric Boat Co. (San Fran.)	92.6
141 S-36	Electric Boat Co. (San Fran.)	89.7
142 S-37	Electric Boat Co. (San Fran.)	87.5
143 S-38	Electric Boat Co. (San Fran.)	81.6
144 S-39	Electric Boat Co. (San Fran.)	78.1
145 S-40	Electric Boat Co. (San Fran.)	77.
146 S-41	Electric Boat Co. (San Fran.)	78.7
153 S-42	Electric Boat Co. (Quincy)	74.4
154 S-43	Electric Boat Co. (Quincy)	74.9
155 S-44	Electric Boat Co. (Quincy)	73.
156 S-45	Electric Boat Co. (Quincy)	73.5
157 S-46	Electric Boat Co. (Quincy)	72.1
158 S-47	Electric Boat Co. (Quincy)	71.4
159 S-48	Lake T. B. Co. (Bridgeport)	97.5
160 S-49	Lake T. B. Co. (Bridgeport)	95.3
161 S-50	Lake T. B. Co. (Bridgeport)	91.6
162 S-51	Lake T. B. Co. (Bridgeport)	88.4
FLEET SUBMARINES		
60 T-2 (SF 2)	Electric Boat Co. (Quincy)	99.3
163 V-1 (SF 4)	Portsmouth, N. H., Navy Yard	4.7
164 V-2 (SF 5)	Portsmouth, N. H., Navy Yard	4.7
165 V-3 (SF 6)	Portsmouth, N. H., Navy Yard	4.7

Note: Submarines authorized but not under construction or contract:
Fleet submarines (6) Nos. 166 to 171.
Neff submarine (1) No. 108.

SHIPYARDS AND DRY DOCKS

New Shipbuilding Company, Miami, Fla.—The Marine Service Company is reported as being a new shipbuilding company recently organized by Louis Marco, C. T. Roberts, and J. E. Sheldon, with a capital of $25,000.

Power Plant, Jersey City, N. J.—Bids are being received by the Vulcan Iron Works, Hudson Street, for a new power plant to replace the structure recently destroyed by fire. The estimated cost is about $40,000.

Floating Dry Dock, Vancouver, B. C.—Plans are under consideration for the construction of a 20,000-ton dock, but all arrangements have not as yet been completed. Announcement regarding the building of this dock is expected within a week or so.

Purchase Plant, San Francisco, Cal.—It is announced by George A. Armes, president of the General Engineering Company that his concern has purchased the holdings of the Triangle Engineering Company, all of the equipment of which will be installed in the plant of the General Engineering Company, which will engage in ship repairing and construction.

PORT IMPROVEMENTS

Wharf, Kahului, T. H.—It is reported from Honolulu that a contract for the construction of a territorial wharf has been let on a bid of $580,000.

Dredging Equipment, Philadelphia, Pa.—The Department of Wharves, Docks and Ferries, Bourse Building, plans the purchase of additional units for its dredging plant, to cost about $500,000. N. L. Stamm, Bourse Building, is engineer.

Bonds for Port Improvements Sold, Tacoma, Wash.—The Port Commission has sold bonds in the amount of $900,000 to a Tacoma firm at a premium of $10,350, the money to be used for the construction of a transit shed and other improvements.

Pier Improvemnts, Etc., Montreal, Canada.—The chairman of the Administrative Committee is receiving bids for repairing guard piers at $24,000; shore cribs, $24,000; inlet through entrance dam, $10,000; overflows, $10,000; and coping, $97,000.

Wharf, New Orleans, La.—The Board of Port Commissioners is planning to repair the Celeste Street wharf, which is to have a steel superstructure, involving the expenditure of about $600,000. H. M. Gallagher, 1 Canal Street, is chief engineer.

Piers, Holmesburg, Pa.—The City of Philadelphia, Pa., plans the completion of the piers and grounds at the Home for Indigent at Holmesburg, to cost about $50,000. W. F. Noller, Holmesburg, is engineer.

Docks, Etc., Windsor, Ont., Canada.—The International Ferry Company plans to build docks and offices at the ferry from private plans and desires prices on all materials required for their building and completion. It is estimated that this project will involve the expenditure of about $150,000.

Ferry Houses, Etc., Palmyra, N. J.—G. F. Sale, Liberty Building, Philadelphia, Pa., has let a contract for the construction of a timber and concrete ferry landing or wharf 60 feet wide, 180 feet long, with appurtenant bridge, etc., at the foot of Cinaminson Avenue, for the Tacony Ferry Company, to the S. E. Browne Company, 90 West Street, New York. The work amounts to $38,491.

Harbor Improvement, Corpus Christi, Tex.—The City of Corpus Christi and Nueces County Commissioners, Texas, plan the establishment of a navigation district; the improvement of the deep water harbor and to equip the port with wharfage and terminal facilities. F. A. Tompkins is county auditor, and C. J. Howard is city engineer.

Pier Superstructure, Philadelphia, Pa.—The Department of Wharves, Docks and Ferries, Bourse Building, has let a contract for building the superstructure of Chestnut Street Pier 4 to the J. S. Rogers Company, Drexel Building, Philadelphia, at a cost of $298,700.

To Improve Port Facilities, Hilo, T. H.—To take care of an expected increase in shipping, $500,000 will be spent immediately in the construction of additional wharf and berthing facilities at Hilo, according to a recent report. A marked increase in the production of canned pineapple and sugar on the Island of Hawaii is predicted.

Terminal Improvements Urged, Tampa, Fla.—In a recent report to the City Commissioners the urgent necessity for the early construction of Tampa's municipal terminals was pointed out, and it is believed that a bond issue of about $1,000,000 will be made available by the city for improving the harbor. The Government officers report that the 27-foot channel will soon be completed and that Tampa will have to provide facilities to care for the increased business resultant from the ability of deeper draft vessels to enter the port.

$5,000,000 Development for Norfolk, Va.—The Norfolk Port Commission has just advised the City Council that the port development work being planned by the Commission will cost in the neighborhood of $5,000,000. Barton Myers, chairman of the Commission, has recommended that the Council consider the question of a bond issue for these improvements for submission to the voters of this city at the November election.

Plans have been drawn, under the direction of the Commission, for pier, warehouse and grain elevator facilities, which will cost upwards of $4,000,000, and a small boat terminal is also contemplated. The piers, warehouses and elevators will be constructed on property now owned by the City of Norfolk, fronting a half mile on Hampton Roads.

Harbor Improvement Plans, Jacksonville, Fla.—It is learned that recommendations made by the rivers and harbors commission of the Chamber of Commerce, with reference to harbor improvements in Jacksonville, have been approved by City Commissioner W. A. Evans, who suggested that the city commission hold a special session to consider the recommendations of the committee and also take early steps to engage the services of expert and experienced engineers to prepare the plans and specifications for, and superintend the construction of, the proposed developments which include the dredging to depth of channel and maintenance; coal and phosphate loading facilities and storage; new pier with shed permitting greater storage capacity, south of the present piers; ladder track on the north side of Pier No. 2; inland storage warehouse for "time cargo" east of Talleyrand Avenue (near the water); additional cotton warehouse space east of Talleyrand Avenue; additional electric trucks for handling cargo to ship side; concerted plan of publicity, and the employment of an experienced commercial agent who knows traffic and rates both rail and water.

New Port Terminal, Jersey City, N. J.—Among the extensive port and terminal improvements now under way at Jersey City, the Lehigh Valley Railroad's program may be said to be one of the largest. This company is constructing a terminal which will serve the railroads and at the same time provide excellent deep water connections with three piers, each to be 7,500 feet long, carrying extensive trackage, warehouse and freight handling facilities in the Greenville section of Jersey City on New York Harbor. The first unit of the terminal for which a 35-foot channel is now being dredged out to deep water will be a 3,500-foot wharf near the foot of Chapel Avenue, Jersey City, providing facilities for the handling of general heavy freight and for unloading ore from boats into cars at the rate of one car per minute. Preliminary plans include storage and classification yards, engine terminal, a large grain elevator, and three piers, the entire terminal to cover about 635 acres and to provide a total dock length of about six miles. Almost the entire length of the south side of the first wharf unit will be filled in practically level with the Pennsylvania Railroad property to the south. All tracks will be carried on solid fill. The channel now being dredged extends along the north side of the wharf site 300 feet wide to the Government bulkhead line, from which it tapers to 250 feet extending out to deep water from this line. When pier 2 is constructed the channel will be widened between the two piers to a maximum of 550 feet. The dredging of about 12,000,000 cubic yards will be necessary for the carrying out of this project, while dredging for the present slip involves the removal of 3,000,000 yards. A large portion of the hydraulic fill from dredging will be required in building up to the necessary elevations for gravity yard rises, some of which will be about 35 feet above mean low water. Gantry cranes and other conveying machinery will be installed on the piers. The warehouses will be of concrete and steel.

New Steel Pier, Jersey City, N. J.—A new steel pier to replace the old wooden pier destroyed by fire a few weeks ago will be constructed by the Erie Railroad Company, at the foot of 12th street. Freight handling and other mechanical equipment will be installed on this pier, the entire project to cost more than $500,000.

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Docks and Transit Shed, Houston, Texas.—The restruction of the cotton docks on the north side of the basin will soon commence. The work includes the enlarging of the docks and the building of a transit shed 100 by 800 feet, with two tracks alongside.

New Dock and Equipment, New York.—The proposed new dock to be built on the Hudson River, north of Spuyten Duyvil Creek, by the Department of Docks, will be equipped with the most modern freight handling and conveying machinery. This dock is estimated to cost about $75,000. Murray Hulbert, Pier A, North River, New York, is dock commissioner.

Large Port Contract Awarded, Galveston, Tex.—The United States Engineer Corps recently awarded to Messrs. Charles Clarke & Company a contract for the construction of four spur dikes to be built from the east jetty of the port out into the channel, thus greatly improving the entrance to the harbor of Port Arkansas. This job amounts to $115,000.

Floating Dry Dock, Vancouver, B. C.—It is reported that if the government permits a subsidy, the port of Vancouver will have a dry dock within a year that will be able to handle any ship entering the port. A floating dry dock has been urged for this port for several years and has been reported upon favorably by a committee of the Board of Trade which has investigated the question of a dry dock for this port.

Charleston, S. C., Terminal Damaged by Fire.—Damage exceeding $1,300,000 was wrought by the recent fire at the Columbus Street terminals of the Charleston Terminal Company, Charleston. It is reported that materials in storage worth about $1,250,000 were destroyed, and that the damage to the wharf and warehouses amounted to several hundred thousand dollars. The company's machine shop, coal hoisting apparatus and other appurtenances were destroyed.

GOVERNMENT WORK

Foundation, San Diego, Cal.—Specification 4528. The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans the foundation for a dispensary and post exchange.

Cooling Tank, Norfolk, Va.—Specification 4523. The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans a cooling tank at the radio station.

Dispensary, San Diego, Cal.—Specification 4527. The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans a dispensary at the Marine Corps Base.

Fire Protection System, Washington, D. C.—Specification 4525. The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans to install a foam fire protection system.

Radio Buildings, Bar Harbor, Maine.—Specification 4521. The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans the construction of radio buildings.

Storehouse, Pearl Harbor, T. H.—Specification 4504. The Bureau of Yards and Docks, Navy Department, Washington, D. C., will receive bids until December 7 for a one-story storehouse.

Lock Planned, Fayetteville, N. C.—The United States Government plans the construction of a third Government lock on the Cape Fear River, to cost about $200,000.

Dredging Contract Award, Detroit, Mich.—The United States Engineer has let a contract for dredging and rock excavation in Livingston Channel, Detroit River, to the Dunbar Dredging Company, Detroit, at a price of $414,500.

Dredging and Filling, San Diego, Cal.—Specification 4485. The Bureau of Yards and Docks, Navy Department, Washington, D. C., has let a contract for dredging and filling in and repairing the Naval Base, to the San Francisco Bridge Company, 14 Montgomery Street, San Francisco, at $.2015 per cubic yard, and 200 days.

Machine Shop, Pearl Harbor, H. T.—Specification 4464. The Bureau of Yards and Docks, Navy Department, Washington, D. C., has let a contract to C. A. Blume, 1309 Sixth Avenue, San Francisco, Cal., for the construction of a one-story machine shop, 181 by 520 feet, with a steel superstructure, at the Naval Station. The price is $45,825, and the work will be completed in 170 days.

Removal of Wreck, Glen Cove, New York.—The United States Engineer Office, First District, New York City, Room 710, Army Building, 39 Whitehall Street, New York City, will receive bids until 12 noon, November 9, for removing the wreck of the tow-boat Carrick No. 5, sunk in Hempstead Harbor, at the south side of Glen Cove Landing. Specifications furnished upon request by those desiring to submit a proposal for this work.

Watertube Boilers Wanted, Memphis, Tenn.—The office of the District Engineer, Mississippi Dredging District, P. O. Box 1017, will receive sealed bids until 3:30 P. M., November 16, 1921, for furnishing and delivering two watertube boilers for United States dredge Beta, and three watertube boilers for United States dredge Henry Flad. Further information may be obtained upon application.

NEW INCORPORATIONS

The Ottoman-American Steamship Company, Wilmington, Del., has been incorporated with a capital of $500,000 to own and operate boats.

The Ludwig Lines, Inc., 50 Pearl Street, New York, have been incorporated with a capital of $100,000 by D. K. Ludwig to carry on a navigation business.

The Fair Oake Steamship Corporation, Wilmington, Del., has been incorporated with a capital of $100,000 to own and operate boats, etc.

The National Pump Company, Wilmington, Del., has been incorporated with a capital of $250,000 to manufacture pumps and pumping machinery.

The Bay Transport Company, San Francisco, Cal., has been incorporated with a capital of $500,000.

The Boston Shipping Company, Boston, Mass., has been incorporated with a capital of $50,000 to carry on a transportation business.

The Ottoman-American Steamship Company, Wilmington, Del., has been incorporated with a capital of $500,000 to own and operate boats.

The Keaston Navigation Company, Inc., Manhattan, N. Y., has been incorporated with a capital of $50,000 by M. Eisner, 241 Utica Avenue, Brooklyn, N. Y.

The Daphne Boat Company, Daphne, Ala., has been incorporated with a capital of $30,000 by George A. Mitchell and C. E. Carter, to establish a transportation system.

CAPITAL INCREASE

The Tri-State Navigation Company, Atlanta, Ga., has increased its capital from $20,000 to $100,000. Homer R. McClatchey is secretary of the company.

BUSINESS OPPORTUNITY

Opportunities for foreign trade announced by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., include the following:

31. An engineer in Norway desires to secure the agency for the sale of motor boats and marine engines for fishing and pleasure. Quotations should be given f. o. b. New York.

Interested firms should apply for additional details to the Bureau, mentioning the reference file number.

FOREIGN ACTIVITIES

New Floating Dock, Blythe, Eng.—A new floating dock has been acquired by Riston's Shipbuilding & Engineering Company, Ltd. The dock is capable of lifting vessels up to 275 feet in length.

To Be Oil Burners, Elswick, Eng.—It is reported that Whitworth & Company, Ltd., Elswick, England, has procured a contract from the Cunard Steamship Company for the conversion of all their coal burning steamers into oil burners.

Motorships, Bristol, Eng.—The keel for the third motorship contracted for by the British India Steam Navigation Company has just been laid at the Albion Dockyard of Messrs. C. Hill & Son. The vessel will have a deadweight capacity of 4,500 tons. The two other combined cargo and passenger vessels being constructed for the same company at this yard are well under way.

New Shipping Company, Valparaiso, Chile.—The Chung Hua Navigation Company has been organized by a number of Chinese residents at Valparaiso with a capital of $4,000,000, for the purpose of running a steamer service between Hong Kong and Chile, via Shanghai, Honolulu, Panama and Peru. At a later date the new line proposes to establish another service from Hong Kong to New York.

Coal Ships, Hamburg, Ger.—It is reported that the Deutsche Werft has received an order from the firm of Sauber Brothers, Hamburg, for the construction of a coal steamer of 4,000 tons capacity. The vessel will be turbine driven and when ready for service will be used in the transportation of coal from England to Hamburg.

Deep Sea Fishing Steamers, Hamburg, Ger.—The German sea fisheries A.-G. in Cuxhaven have placed an order with the Reiherstieg Schiffswerften for the construction of fifteen new deep sea fishing steamers. The firm of Petersen & Alpers, Hamburg, have placed an order for the construction of a cargo steamer of the newest type, to be fitted with machinery of 600 horsepower.

Naval Dockyard to be Extended, Sourabaya, N. E. I.—It is learned that the sum of 5,500,000 florins is to be expended by the Netherlands East Indies Government during the present year for the further improvement of the harbor. New docks, wharves and piers in addition to other works are planned.

Deep Water Dock, Brest, France.—Plans for the construction of a deep water dock have been authorized by the Minister of Public Works. The estimated cost of the project is about 17,000,000 francs, which will include a quay to be 245 metres in length, with a berth depth of 12 metres, and equipped with four electric cranes, each having a lifting capacity of 8 tons.

Dry Dock, Manila, T. H.—According to recent reports plans are under way by the Honolulu Iron Works and the Earnshaw Shipways for the construction of a marine railway or dry dock of 8,000 tons.

Dockyard, Shanghai, China.—The Kiangnan Dockyard plans the construction of another dockyard on the grounds in front of the naval wireless telegraph station.

Shipbuilding Activities, Hongkong, China.—Hongkong shipbuilders are reported to have under construction at the present time 44,759 tons of ships in three establishments alone, although there is a general depression in shipyards in other parts of the Far East. Four oil tankers of 5,600 tons each for the Anglo-Saxon Petroleum Company and one steamer for Jardin Matheson & Company are being built at the Hongkong & Whampoa Dock Company, Kowloon.

Port Project, Whampoa, China.—Negotiations are being carried on between a group of Chinese capitalists from the Straits Settlements and the Canton authorities to charter and open Whampoa as a commercial port. Extensive plans have been presented for the construction of a harbor capable of accommodating ocean going vessels.

Winter Cruises Arranged, England.—A series of winter cruises have been arranged by the White Star Line to the West Indies next January, February and March, the steamer Megantic to be put on this route. Two special trips from New York through the Mediterranean with the liner Arabic will be arranged for next January and February.

Steamer Launched, Amsterdam, Holland.—The 14,400 ton steel screw steamer Tjikarang, built to the order of the Java-China-Japan Line, was recently launched from the Amsterdam yard of the Netherlands Shipbuilding Company.

New Fleet of Steamers Nearly Ready, Hamburg, Ger.—It is expected that by the end of the present year twelve new steamers will have been completed at Hamburg for the East African service of the Woermann Line, the German East African Line, the Hamburg American Line, and the Hamburg, Bremen Africa Line. The turbine steamers Wangoni, Usukuma and Usaramo, each of 7,800 gross tons, will be completed and ready for sailing the latter part of November, and will ply in the passenger service to South and East Africa.

Hamburg-Panama Service, Germany.—A new monthly service between Hamburg and Panama will be inaugurated with the sailing on November 15 of the Antiocha, followed by the Amassia, Andalia and Eupatoria. The ships range from 5,000 to 6,000 tons each. The vessels will also stop at the ports of Venezuela, Columbia, and through the Panama Canal to the Pacific ports of Central America and Mexico.

New Harbor, Shantung, China.—A new company is reported to have been organized for the purpose of opening and developing the port of Tsingingchow, and it is said that the Shantung provincial authorities as well as various ministries in Peking are ready to support the undertaking. The company has already collected $3,000,000 for this project, and proposes that the Government should furnish the remaining two hundred thousand dollars necessary for the carrying out of the work.

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BUSINESS NOTES

The Quigley Furnace Specialties Company, Inc., 26 Cortlandt Street, New York, announces the acquisition of their pulverized fuel department by The Hardinge Company, 120 Broadway, New York. This department having been taken over practically intact, the Hardinge Company states that there will be no change in the method of conducting the business at their offices, and with their experience and manufacturing facilities will be enabled, with their present equipment and augmented staff to further extend the activities of the Quigley Pulverized Fuel System. The rapid growth of the Quigley Company's refractory specialties business (high temperature cement and insulation) has made it advisable for the company to devote their entire attention to this branch of work, which will be continued as heretofore.

TRADE PUBLICATIONS

Weld Pipe.—The characteristics and uses of hammer weld pipe, a new product of the National Tube Company, Pittsburgh, Pa., are given in a recent bulletin published by this company. The pipe is made by bending a steel plate into tubular form with the edges overlapping and then welding the overlapped edges after they have been heated, by hammer forging them on an anvil block supported on a horn inside the pipe. The manufacture is taken up in detail and applications of the pipe products are described and illustrated.

Fluid Compressed Products.—The growth and the development of the Sandusky Foundry & Machine Company, Sandusky, Ohio, producers of fluid compressed products in bronze, iron, and special alloys are given in this booklet. These products are used in pulp mills, chemical plants, hydraulic equipment, ship construction, pneumatic tubes and for various other purposes. Shop equipment required for the machining and working of tubular products is described in detail. Periscope tubes for submarines and tubes for propeller shaft sleeves are among the highly specialized products of the company intended for ship work.

Boiler Performance.—A folder giving the result of an official test conducted by George H. Perkins, consulting engineer of Boston, on a 950 horsepower Heine watertube boiler has been sent out by the Heine Boiler Company, St. Louis, Mo. Although this boiler was rated by the builders at 950 horsepower, it actually developed 2,858 horsepower in the test giving a load rating of 300 percent.

Don't Let It Happen to You.—This book gives the story of a business venture that might have been profitable only inadequate equipment caused a loss on certain contracts rather than gains that had been expected. The Williams Tool Corporation, Erie, Pa., uses this story to introduce the proper principles, machinery and dies which should be used for pipe threading, and the necessity of always maintaining an adequate supply of spare dies and machine parts. The book is actually a complete treatise on pipe threading practice and, as stated by the company, was written for the man who owns or operates a power pipe machine, and represents an earnest endeavor to educate all operators on power pipe machines to produce better threads while at the same time increasing their output.

Pumping Machinery.—A bound set of ten new bulletins showing equipment made by the Warren Steam Pump Company, Warren, Mass., describe vacuum pumps, horizontal duplex piston pumps, vertical single piston pumps, duplex plunger pumps, and other types. Special attention is called to bulletin No. 105, which contains useful information in the form of tables for designing and operating engineers. Bulletin No. 106 illustrates and describes the patented Warren "Eclipse" valve motion with which Warren single pumps are fitted. Positiveness of operation, economy of steam consumption and increased overall efficiency are claimed for this valve gear, which is installed on all reciprocating pumps on the battleships *Oklahoma* and *Idaho*, as well as on several of the ships of the present naval construction program.

Condensing Equipment.—A complete set of auxiliary equipment necessary for the operation of a modern steam power plant has been described in detail by the C. H. Wheeler Manufacturing Company, Philadelphia, Pa., in a book issued by this company. The economy of high vacuum and the thermodynamics of condensers in general are discussed in the first chapters of the book, while other chapters are devoted to details of jet, surface and barometric condensers, vacuum pumps, centrifugal and direct acting pumps, feed water heaters and the like. A special chapter outlines the difference between marine and stationary practice and the special types of equipment developed for marine service in which the requirements are more rigid than in land installations.

Cutting Costs.—Power and conveyor belting made by R. D. Skinner & Company, Inc., is the subject of a booklet recently sent out by the company. "Lion's Paw" belting is interwoven from cotton and coated by the Buckner patent process, which eliminates the necessity of surface treatment. Comparisons are made between the service obtained with this and other type fabricated rubber and leather belts, using the results of a series of efficiency tests on which to base these comparisons.

DeLaval Review.—For the purpose of setting forth the development of centrifugal machinery the DeLaval Separator Company, New York, has begun the publication of a monthly bulletin which is in the form of a news sheet. The first issue of the "Review" contained articles on the application of DeLaval transformer oil purifiers and multiple clarifiers to various industrial uses.

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1701 Walnut Street, Philadelphia, Pa.
Secretary—C. S. King.

AMERICAN STEAMSHIP OWNERS' ASSOCIATION
11 Broadway, New York
Vice-President and General Manager—Winthrop L. Marvin.

UNITED STATES SHIP OPERATORS' ASSOCIATION
149 Broadway, New York
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5 Adelphi Terrace, London, W. C.

INSTITUTION OF ENGINEERS AND SHIPBUILDERS IN SCOTLAND
39 Elmbank Crescent, Glasgow.

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Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

INSTITUTE OF MARINE ENGINEERS, INCORPORATED
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